SRWRS

Sacramento River Water Reliability Study

Interim Report

June 2003

EXECUTIVE SUMMARY

The Sacramento River Water Reliability Study (SRWRS) is being developed under the authorization of Public Law (PL) 106-554, Appendix D, Division B, Section 103, which directs the Secretary of the Interior to conduct a feasibility study for a Sacramento River diversion that is consistent with the WFA, dated April 24, 2000. On June 26, 2002, Placer County Water Agency (PCWA) signed a Memorandum of Agreement with Reclamation to share a minimum of 50 percent of the study cost. PCWA then entered into separate cost-sharing agreements with its third party cost-sharing partners: Sacramento Suburban Water District (SSWD), the City of Roseville (Roseville), and the City of Sacramento (Sacramento).

The goal of the SRWRS is to develop a water supply plan that is consistent with the Water Forum Agreement (WFA) objectives of pursuing a Sacramento River diversion to meet water supply needs of the Placer-Sacramento region and promoting ecosystem preservation along the lower American River. The results from the SRWRS will be used as the basis for seeking necessary approvals and permits from the responsible resource agencies to allow execution of necessary agreements and construction of the recommended water supply infrastructure. This **Interim Report** documents the preliminary findings of the study to date and identifies future steps of the SRWRS.

The SRWRS study area includes the Sacramento area north of the American River and east of the Sacramento River (see **Figure ES-1**). The American River watershed (or drainage basin) covers about 2,100 square miles northeast of the City of Sacramento and includes portions of Placer, El Dorado, and Sacramento counties. The American River is a tributary of Sacramento River. The Sacramento River watershed covers most northern California counties. Folsom Dam and Reservoir on the American River and Shasta Dam and Reservoir on the Sacramento River are Central Valley Project (CVP) storage facilities, owned and operated by the United States Department of Interior, Bureau of Reclamation (Reclamation).

STUDY DEVELOPMENT

The SRWRS will include a feasibility study and a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for identified water supply alternatives as the basis for seeking necessary Biological Opinions and permits from the responsible regulatory agencies to allow execution of necessary agreements and construction of the recommended water supply infrastructure. Development of the SRWRS will be consistent with the following principles:

- Satisfying requirements stipulated in PL 106-554 to complete a feasibility study for a Sacramento River diversion that is consistent with the Water Forum Agreement and includes the following components: 1) development of a range of reasonable options, 2) an environmental evaluation, and 3) consultation with federal and state resource management agencies regarding potential impacts and mitigation measures. Furthermore, Congress requires the SRWRS to be developed in coordination with the California Federal Bay-Delta Program (CALFED).
- Observing existing applicable laws, regulations, water rights, contracts and legal agreements, and federal planning guidelines, including, but not limited to, National Environmental Protection Act (NEPA), federal planning guidelines such as *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies,* California Environmental

Quality Act (CEQA), California water laws, and obligations of the cost-sharing partners in their charters and as defined in California laws.

- Minimizing overall impact on the environment to the extent feasible, being cost-effective, and complementing and enhancing the overall reliability of the Placer-Sacramento region's water supply system through increased interconnectivity and source redundancy.

The SRWRS plan will be consistent with the WFA in pursuing a Sacramento River diversion to accomplish the following objectives envisioned in the agreement: 1) meeting the needs of planned future growth within the Placer-Sacramento region, 2) maintaining a reliable water supply while reducing diversions of surface water from the American River in future dry years to preserve the river ecosystem, and 3) enhancing groundwater conjunctive management to help sustain the quality and availability of groundwater for the future.

WATER DELIVERY QUANTITIES

The SRWRS cost-sharing partners (PCWA, SSWD, Roseville, and Sacramento) have identified their long-term needs for additional water supplies to meet growing water supply demands and reliability objectives in their respective service areas (see **Appendix A** for details). **Table ES-1** below presents a summary of requests for additional surface water diversion and treatment capacity to balance projected 2030 demand and supply and enhance water supply reliability.

Table ES-1. Water Delivery Quantities Considered in the SRWRS

Water Purveyor	Requested Maximum Annual Additional Water Deliveries (AF)	Source	Type of Use	Requested Treatment Capacities (mgd)	Purpose of Requested Treatment Capacities
PCWA	35,000	CVP	M&I	65	Max-day demand
SSWD	29,000[1]	MFP	M&I	15	Reliability and redundancy
Roseville	7,100[2]	MFP	M&I	10	Max-day demand
Sacramento	58,000[3]	Water rights, water wheeling requests	M&I	165	Max-day demand (155 mgd) and redundancy (10 mgd)
Total	129,100			255	

Key:
AF – acre-feet
MFP – Middle Fork Project
M&I - municipal and industrial
max-day - maximum-day
mgd – million gallons per day

[1] For Water Forum average, drier, and driest years only; the WFA allows SSWD to exercise this entitlement in Water Forum wet years using diversion from the American River.
[2] Roseville only considers additional diversions from a river other than the American River.
[3] The WFA does not establish a volumetric limitation for Sacramento's total diversion; the estimated additional water supply to meet its projected demand is about 58,000 AF per year, based on the difference between the projected demand and the simulated average diversion for Sacramento that could be realized using then-existing diversion facilities on the American and Sacramento rivers. However, Sacramento could divert up to 81,800 AF per year under its water rights on the Sacramento River at a new diversion by reducing the diversion under its Sacramento River water rights at its existing Sacramento River Water Treatment Plant downstream of the confluence with the American River.

WATER FORUM AGREEMENT AND A SACRAMENTO RIVER DIVERSION

Two key documents form the cornerstone of the SRWRS: (1) Reclamation's American River Water Resources Investigation (ARWRI), which includes an EIS completed in September 1997, and (2) the January 2000 WFA, which includes an EIR certified in November 1999.

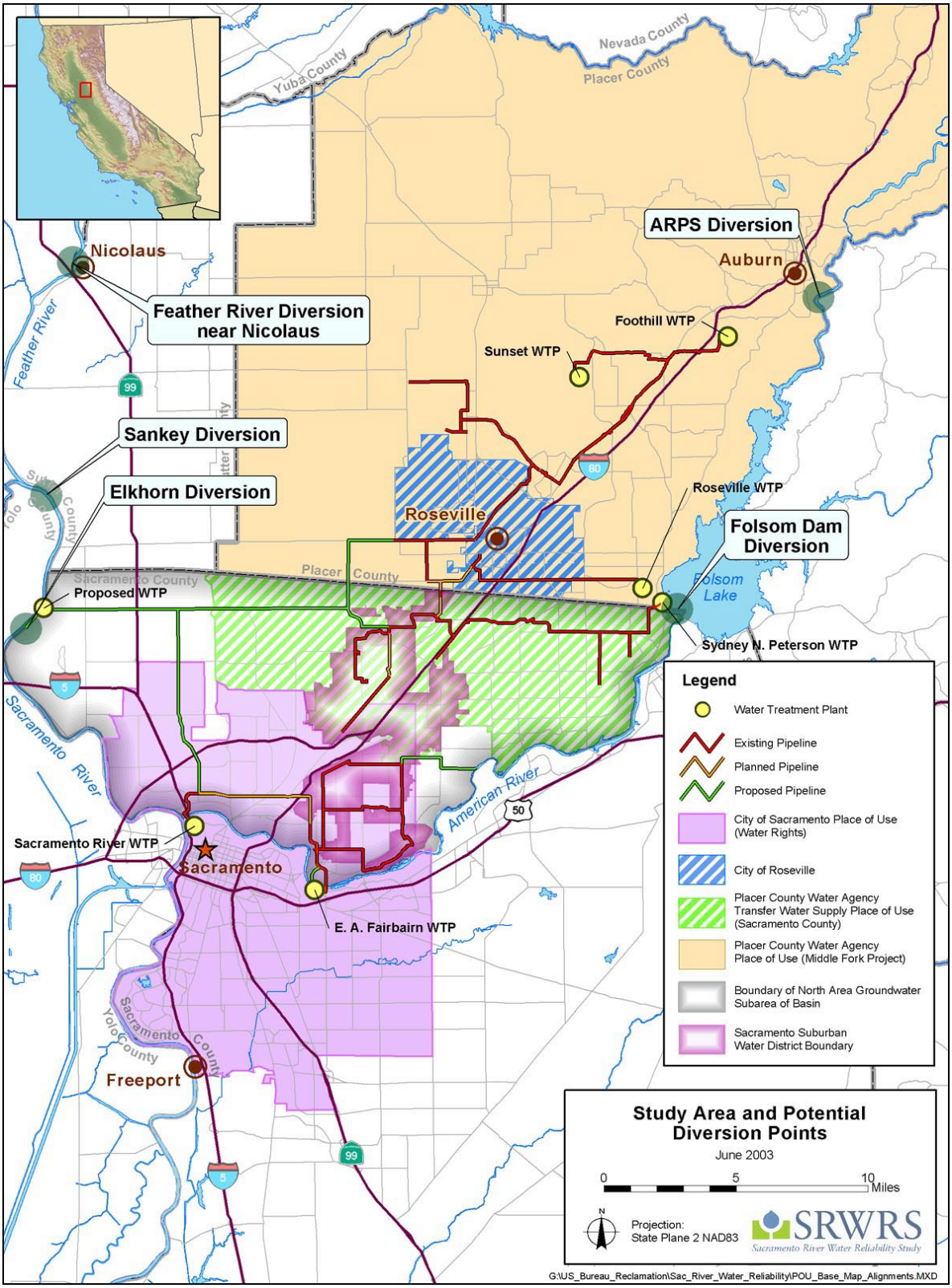

Figure ES-1. SRWRS Study Area and Potential Diversion Points

Both the ARWRI and WFA identify increased water supply needs resulting from planned growth in Placer and Sacramento counties, and recognize the importance of preserving the lower American River for its fishery, wildlife, recreational, and aesthetic values. The ARWRI identifies an environmentally preferred alternative to meet projected demands, which includes additional surface water diversions from the American, Feather, and Sacramento rivers and regional conjunctive management.

A Sacramento River diversion is a key component of the WFA's strategy to provide a safe and reliable water supply in the Sacramento/Placer county region while preserving the fishery, wildlife, and aesthetic values of the lower American River. This strategy supports and facilitates regional conjunctive management that is consistent with the environmentally preferred alternative of ARWRI.

Diversions from the Sacramento River Anticipated in the Water Forum Agreement

To implement the objective of preserving the lower American River, the WFA signatories, including SRWRS cost-sharing partners (PCWA, SSWD,[1] Roseville, and Sacramento), agreed on a set of year-type[2] dependent limitations on diversion from the American River, provided all required conditions were satisfied.

Affected diversions of SRWRS cost-sharing partners under their water rights and contract entitlements include the following: 1) PCWA's Central Valley Project (CVP) contract delivery of up to 35,000 AF per year, and up to 500 AF per year of water right diversion from its Middle Fork Project (MFP), 2) SSWD's water contract delivery of 29,000 AF per year from PCWA's MFP in non-wet years (i.e., "below Hodge," when March-through-November unimpaired flow to Folsom Lake is below 1.6 million AF), 3) Roseville's water contract delivery of up to 7,100 AF from either CVP or PCWA's MFP, and 4) A portion of Sacramento's water-righted diversion from the American River at its Fairbairn Water Treatment Plant (WTP). The WFA limitations provide that up to 100 million gallon per day (mgd), or 155 cubic feet per second (cfs), of diversion from the American River could be forgone during summer months when peak demand occurs.[3]

The aforementioned limitations on diversions from the American River for PCWA, SSWD, and Sacramento were negotiated on the basis that these water purveyors would be able to divert the forgone amount from a future diversion on the Sacramento River. Currently, PCWA and SSWD lack access to diversions on the Sacramento River or exchange agreements for such diversions. Similarly, Sacramento needs adequate diversion capacity on the Sacramento River to recover the forgone diversion at its Fairbairn WTP and provide surface water for retail, wholesale, and wheeling services to the region on a maximum-day (max-day) basis.

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[1] SSWD was formed in 2002 through consolidation of the former Arcade Water District (AWD) and the former Northridge Water District (NWD). NWD has a water sale agreement with PCWA for 29,000 AF per year of MFP water used in a groundwater stabilization program. In 2000, as part of the WFA, NWD entered into a Purveyor Specific Agreement (PSA) containing provisions for delivery of 29,000 AF per year from PCWA's MFP. After the consolidation, these provisions were applied to the Northridge service subarea of SSWD. AWD was not a WFA signatory. Currently, SSWD has a draft consolidated Purveyor Specific Agreement under review by the Water Forum Successor Effort.

[2] The WFA defines year-types based on the cumulative amount of March-through-November unimpaired inflow to Folsom Lake: wet (above 1,600,000 AF), average (between 1,600,000 and 950,000 AF), drier (between 950,000 and 400,000 AF), and driest (below 400,000 AF).

[3] The resulting quantity varies by hydrologic condition, precluding easy quantification of potential effect of these limitations.

Potential Impacts to the Region Without a Sacramento River Diversion

If the WFA were implemented without a Sacramento River diversion, and if the signatories observe the limitations on diversions from the American River, the following consequences would affect the region:

- Significant projected unmet demands resulting from existing beneficial uses and planned growth.
- Significant reductions in surface water delivery to agricultural users in the PCWA service area to meet projected unmet demand.
- Significant groundwater impacts to meet the projected unmet demand in the PCWA and Roseville service areas.
- Significant loss of in-lieu groundwater recharge opportunities for regional conjunctive management in Sacramento-Placer counties to meet projected unmet demands.

Loss of the in-lieu recharge opportunity for conjunctive management combined with the current overdraft in the groundwater basin in the Placer-Sacramento region would result in additional depletion, increasing the potential of water quality deterioration and permanent loss of usable groundwater aquifer. Not only would the conjunctive management envisioned by the WFA be jeopardized, regional water supplies would become increasing unreliable as a result of depleting the supplemental water supply. The potential breakdown of one of the two Water Forum co-equal objectives, providing adequate regional water supply reliability, could also significantly affect implementation of WFA strategies for the other co-equal objective of preserving the ecosystem along the lower American River.

ALTERNATIVES UNDER CONSIDERATION

Each alternative identified for the SRWRS will include a plan for operating a package of water supply infrastructure components to meet water supply needs of the cost-sharing partners. The infrastructure components include new or expanded diversion(s) from the Sacramento, Feather, or American rivers, and new or expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines.

The alternatives currently under consideration in the SRWRS (see **Figure ES-1**) include the proposed project with joint diversion and treatment facilities for all cost-sharing partners and four alternatives. For these four alternatives, the partners may share facilities to a greater or lesser degree. Through a public scoping process and continued planning, engineering and environmental studies, the SRWRS will add, remove, and modify alternatives for further study.

Proposed Project: Elkhorn Diversion Alternative

The proposed project encompasses constructing a joint diversion from the Sacramento River and treatment facilities to serve the cost-sharing partners. The diversion facility would consist of expanding the existing Elkhorn Diversion owned by NMWC and located on the east bank of the Sacramento River, upstream of the mouth of the American River at approximately river mile 73.3, or constructing a new diversion near the existing Elkhorn Diversion. The proposed project would have a total discharge capacity of 345 cfs. Raw water would be lifted from the pump station to an 84-inch pipeline through which it would be conveyed to a new WTP. Treated water from the new WTP would be conveyed to serve SSWD via a transmission line that would connect to the service areas of the cost-sharing partners.

Implementing a Sacramento River diversion for the cost-sharing partners would require a change in the point of diversion for PCWA's CVP contract and for Sacramento's Sacramento River water right permit, and an

exchange agreement between Reclamation and PCWA for SSWD and Roseville diversions under their contract entitlements from PCWA's MFP.

Sankey Diversion Alternative

A Sankey Diversion alternative assumes that PCWA, SSWD, and Roseville would divert water from the Sacramento River near the confluence of the Sacramento River and the Natomas Cross Canal and build separate treatment, storage, and transmission facilities to meet their needs. This diversion would be located at or near the second diversion that NMWC is developing under its CALFED-supported American Basin Fish Screen and Habitat Improvement Project. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

Feather River Diversion Alternative

A Feather River alternative assumes that PCWA, SSWD, and Roseville would divert water from the Feather River near Nicolaus and build separate treatment, storage, and transmission facilities to meet their needs. The CVP would not be able to supply water directly to any diversion location on the Feather River, and thus a further agreement with the SWP and possibly a modification to the Cooperative Operation Agreement would be required for this alternative.

Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

American River Pump Station Alternative

An American River Pump Station alternative assumes that PCWA would expand its American River Pump Station near Auburn and construct new treatment and transmission facilities to serve its needs. The CVP would not be able to provide a reliable water supply to PCWA at this location and thus, PCWA would divert from its MFP water rights. Reclamation would need to reassign PCWA CVP contract entitlement to MFP water sale contractors who divert water at Folsom Dam (SSWD, Roseville, or SJWD).

SSWD would divert from the existing SJWD diversion facilities at Folsom Dam. Roseville would increase use of groundwater to satisfy its needs in this alternative, but would have no additional surface water diversions. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

Folsom Dam Alternative

A Folsom Dam alternative assumes that PCWA and SSWD would use the existing or expanded diversion, treatment, and transmission facilities of SJWD at Folsom Dam. Roseville would increase use of groundwater to satisfy its needs in this alternative, but not have any additional surface water diversions. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

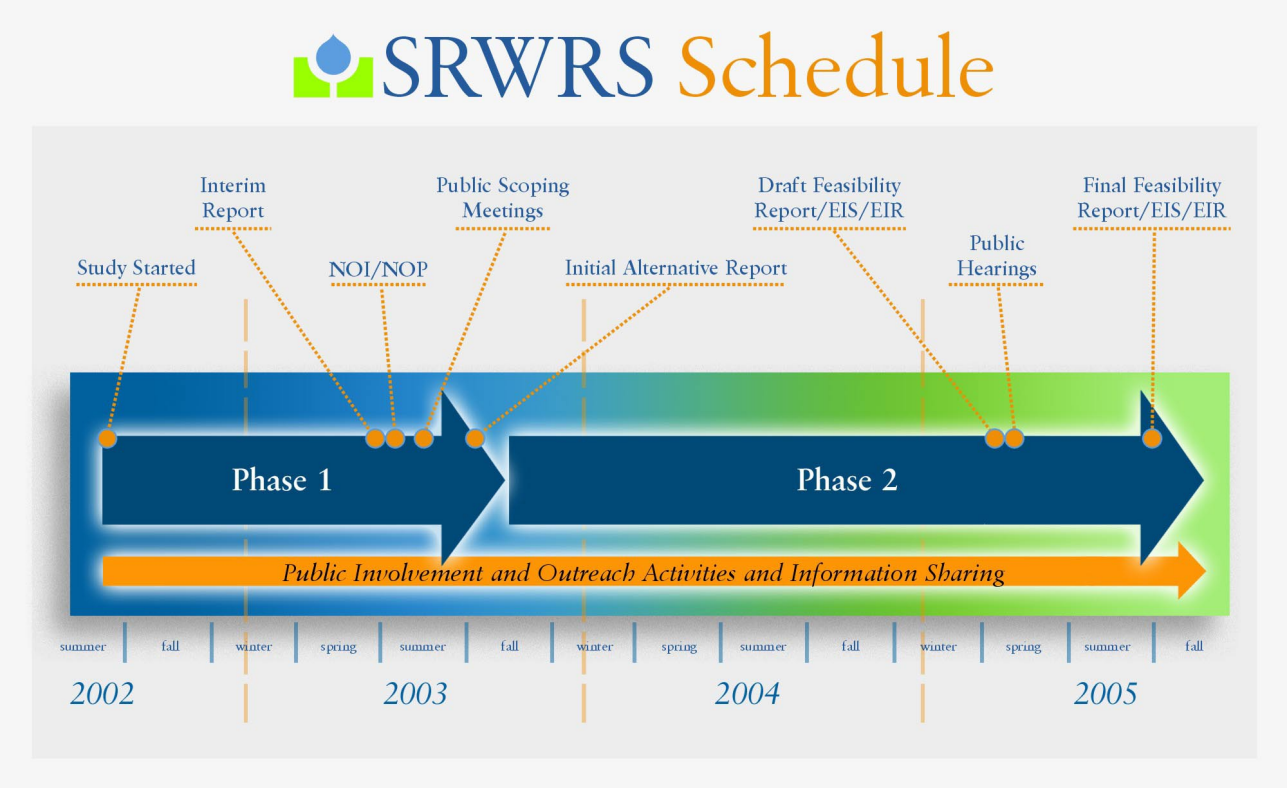
NEXT STEPS OF SRWRS DEVELOPMENT

The SRWRS development includes four phases: (1) Initial Investigation Phase; (2) Initial Plans Phase; (3) Alternative Plans Phase; and (4) Recommended Plan Phase. This Interim Report summarized the findings in the Initial Investigation Phase, and the SRWRS is currently in the Initial Plan Phase of study development. Tasks to be performed during this phase include the following:

- Initializing public scoping process including issuing the Notice of Intent/Notice of Preparation (NOI/NOP) for the preparation of the EIS/EIR.
- Developing preliminary alternatives.
- Performing initial screening of preliminary alternatives.
- Initializing agency coordination and consultation.
- Continuing public involvement efforts.

Figure ES-2 shows the tentative SRWRS schedule for completing the feasibility study and environmental documentation. The schedule is subject to revision to reflect progress in study development and agency consultation.

Figure ES-2. Tentative Schedule for SRWRS Development



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LIST OF ABBREVIATIONS

ABFSHIP	American Basin Fish Screen and Habitat Improvement Project
AF	Acre-feet
AFRP	Anadromous Fish Restoration Program
AROG	American River Workgroup
ARPS	American River Pump Station
ARBCA	American River Basin Cooperating Agencies
Basin Plan	Water Quality Control Plan for the Sacramento River and the San Joaquin River Basin
BO	Biological Opinion
CALFED	CALFED Bay-Delta Program
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
Comprehensive Study	Sacramento-San Joaquin River Basins Comprehensive Study
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
D-xxxx	SWRCB Decision-xxxx
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EWA	Environmental Water Account
JPA	Joint Power Authority
Max-day demand	Maximum-Day Demand
M&I	Municipal and Industrial
MFP	Middle Fork Project
mgd	Million gallons per day
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMWC	Natomas Mutual Water Company
NOI	Notice of Intent
NOP	Notice of Preparation
P&G	*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*
PCWA	Placer County Water Agency
PG&E	Pacific Gas and Electric Company
PL	Public Law
PSA	Purveyor Specific Agreement (in the WFA)
Reclamation	Bureau of Reclamation
ROD	Record of Decision
Roseville	City of Roseville
RWA	Regional Water Authority
RWMP	Regional Water Master Plan (developed by the ARBCA)
Sacramento	City of Sacramento
SAFCA	Sacramento Area Flood Control Agency

SGA	Sacramento Groundwater Authority
SJWD	San Juan Water District
SMUD	Sacramento Municipal Utility District
SOI	Sphere of Influence
SSWD	Sacramento Suburban Water District
SRWRS	Sacramento River Water Reliability Study
SWRCB	State Water Resources Control Board
USACE	U.S. Army Corps of Engineers
Water Forum	Sacramento Area Water Forum
Water Forum year types	American River Basin water year types defined in the WFA
WFA	Water Forum Agreement
WQCP	1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
YCWA	Yuba County Water Agency

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CHAPTER 1. INTRODUCTION

The goal of the Sacramento River Water Reliability Study (SRWRS) is to develop a water supply plan that is consistent with the Water Forum Agreement[1] (WFA) objectives of pursuing a Sacramento River diversion to meet water supply needs of the Placer-Sacramento region and promoting ecosystem preservation along the lower American River. The results from the SRWRS will be used as the basis for seeking necessary approvals and permits from the responsible resource agencies to allow execution of necessary agreements and construction of the recommended water supply infrastructure. This **Interim Report** documents the preliminary findings of the study to date and identifies future steps of the SRWRS.

*This **Interim Report** provides updates on development of the Sacramento River Water Reliability Study.*

The SRWRS study area includes the Sacramento area north of the American River and east of the Sacramento River (see **Figure 1-1**). The American River watershed (or drainage basin) covers about 2,100 square miles northeast of the City of Sacramento and includes portions of Placer, El Dorado, and Sacramento counties. The American River is a tributary of Sacramento River. The Sacramento River watershed covers most northern California counties. Folsom Dam and Reservoir on the American River and Shasta Dam and Reservoir on the Sacramento River are Central Valley Project (CVP) storage facilities, owned and operated by the United States Department of Interior, Bureau of Reclamation (Reclamation).

STUDY AUTHORIZATION

The SRWRS is authorized under Public Law (PL) 106-554, Appendix D, Division B, Section 103, which directs the Secretary of the Interior to conduct a feasibility study for a Sacramento River diversion project, consistent with the WFA, dated April 24, 2000.

As directed in PL 106-554 (see page 1-3 of this Interim Report), the SRWRS is to consider a Sacramento River diversion to accommodate the following water supply requests.

- **Placer County Water Agency (PCWA)** – 35,000 acre-feet (AF) per year of CVP contract water (under an existing CVP contract) for municipal and industrial (M&I) uses
- **Sacramento Suburban Water District or SSWD**– 29,000 AF per year from its PCWA water sale agreement[2] for use in a groundwater stabilization project
- Other diversions agreed upon by the WFA signatories and potentially affected parties upstream on the Sacramento River. The SRWRS has identified two additional potential diversion benefactors and project partners:
    - **City of Roseville (Roseville)** – 7,100 AF per year from its PCWA water sale agreement for use in groundwater recharge and system reliability.
    - **City of Sacramento (Sacramento)** – An additional diversion point for its water rights to improve system reliability.

[1] The Sacramento Area Water Forum and the WFA are described in Chapter 2.

[2] This water sale agreement was originally signed by the former Northridge Water District. (In 2002, Northridge Water District and Arcade Water District consolidated to form SSWD.)

COST-SHARING PARTNERS

The Reclamation Manual, Directives and Standards CMP 05-02, requires non-federal cost-sharing for the SRWRS. On June 26, 2002, PCWA signed a Memorandum of Agreement with Reclamation to share a minimum of 50 percent of the study cost. PCWA then entered into separate cost-sharing agreements with its third party cost-sharing partners: SSWD, Roseville, and Sacramento.

Placer County Water Agency, Sacramento Suburban Water District, the City of Roseville, and the City of Sacramento are cost-sharing partners of the SRWRS.

As directed by PL 106-554, Reclamation also entered into a Financial Assistance Grant Agreement with Placer County on September 19, 2002, supporting development of a countywide habitat conservation plan known as Placer Legacy. The grant and the development of Placer Legacy are outside of the scope of the SRWRS; however, the first stage of plan development will address western Placer County, a focus area of the SRWRS.

Study Authorization, Public Law 106-554 Appendix D Division B

SEC. 103. (a) IN GENERAL.—The Secretary of the Interior shall conduct a feasibility study for a Sacramento River, California, diversion project that is consistent with the Water Forum Agreement among the members of the Sacramento, California, Water Forum dated April 24, 2000, and that considers—

(1) consolidation of several of the Natomas Central Mutual Water Company's diversions;
(2) upgrading fish screens at the consolidated diversion;
(3) the diversion of 35,000 acre feet of water by the Placer County Water Agency;
(4) the diversion of 29,000 acre feet of water for delivery to the Northridge Water District;
(5) the potential to accommodate other diversions of water from the Sacramento River, subject to additional negotiations and agreement among Water Forum signatories and potentially affected parties upstream on the Sacramento River; and
(6) an inter-tie between the diversions referred to in paragraphs (3), (4), and (5) with the Northridge Water District's pipeline that delivers water from the American River.

(b) REQUIRED COMPONENTS.—The feasibility study shall include—

(1) the development of a range of reasonable options;
(2) an environmental evaluation; and
(3) consultation with Federal and State resource management agencies regarding potential impacts and mitigation measures.

(c) WATER SUPPLY IMPACT ALTERNATIVES.—The study authorized by this section shall include a range of alternatives, all of which would investigate options that could reduce to insignificance any water supply impact on water users in the Sacramento River watershed, including Central Valley Project contractors, from any delivery of water out of the Sacramento River as referenced in subsection (a). In evaluating the alternatives, the study shall consider water supply alternatives that would increase water supply for, or in, the Sacramento River watershed. The study should be coordinated with the CALFED program and take advantage of information already developed within that program to investigate water supply increase alternatives. Where the alternatives evaluated are in addition to or different from the existing CALFED alternatives, such information should be clearly identified.

(d) HABITAT MANAGEMENT PLANNING GRANTS.—The Secretary of the Interior, subject to the availability of appropriations, is authorized and directed to provide grants to support local habitat management planning efforts undertaken as part of the consultation described in subsection (b)(3) in the form of matching funds up to $5,000,000.

(e) REPORT.—The Secretary of the Interior shall provide a report to the Committee on Resources of the United States House of Representatives and to the Committee on Energy and Natural Resources of the United States Senate within 24 months from the date of enactment of this Act on the results of the study identified in subsection (a).

(f) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary of the Interior to carry out this section $10,000,000, which may remain available until expended, of which—

(1) $5,000,000 shall be for the feasibility study under subsection (a); and
(2) $5,000,000 shall be for the habitat management planning grants under subsection (d).

(g) LIMITATION ON CONSTRUCTION.—This section does not and shall not be interpreted to authorize construction of any facilities.

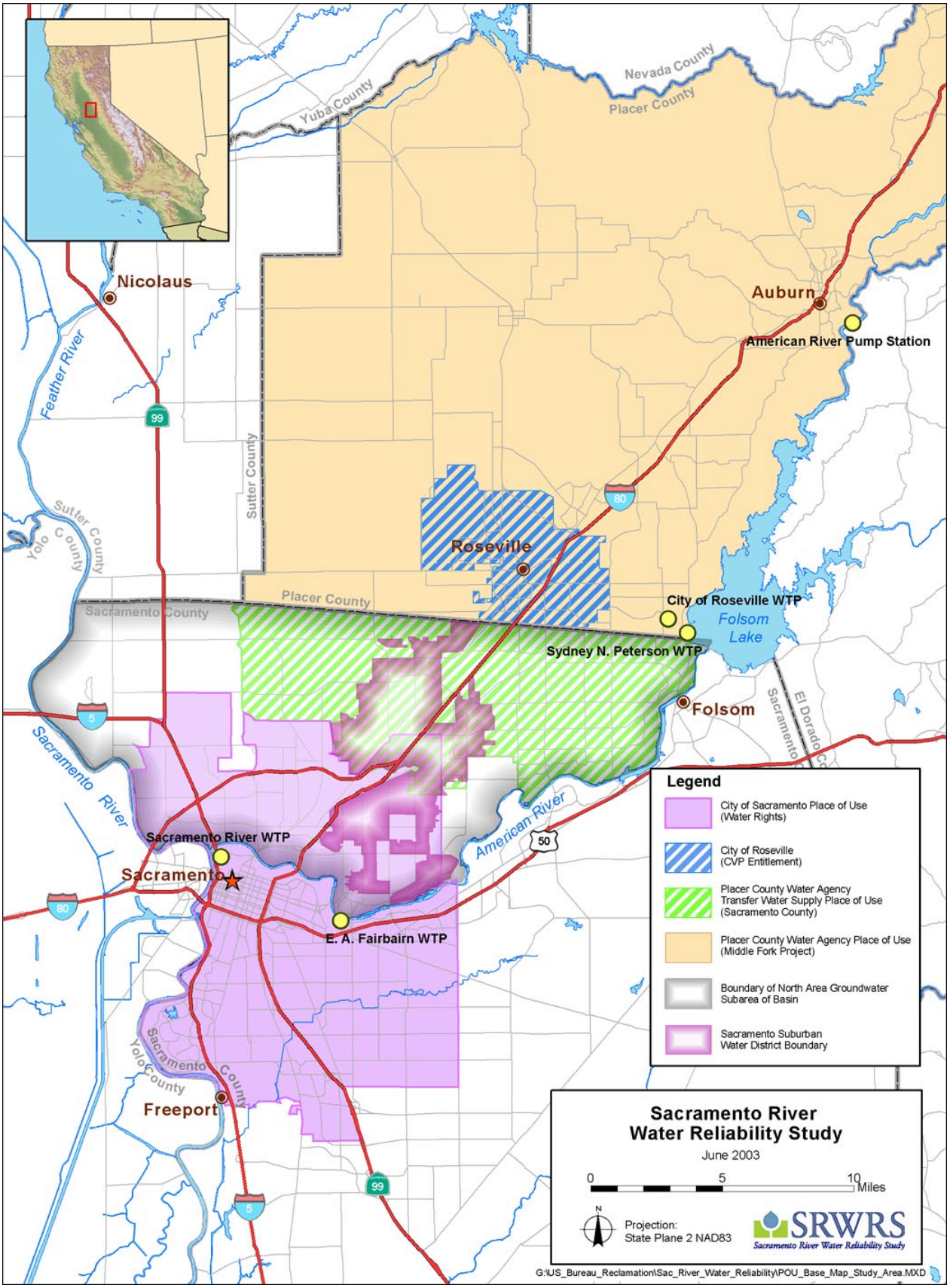

Figure 1-1. SRWRS Study Area Map

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CHAPTER 2. RELATED STUDIES, PROJECTS, AND PROGRAMS

The concept of a Sacramento River diversion for water supply in the Placer-Sacramento region has been included in or related to many previous and ongoing local, regional, and statewide studies, projects, and programs. These related efforts form the basis for many elements of the SRWRS, as depicted in **Figure 2-1**, and they are described below.

PREVIOUS PROGRAM-LEVEL STUDIES

Two program-level analyses that relate directly to the SRWRS are the American River Water Resources Investigation (ARWRI) and the Sacramento Area Water Forum (Water Forum). Both of these program-level studies were conducted to develop a comprehensive plan to address a complex suite of problems that could not be resolved by an individual project. Both studies concluded that conjunctive use and groundwater management are supportable alternatives and offer local assistance for sustainable local programs.

The SRWRS will tier from the programmatic ARWRI (including its Environmental Impact Statement [EIS]) and the Water Forum Agreement (including its Environmental Impact Report [EIR]). **Table 2-1** below compares major study elements addressed in these two programmatic documents and the SRWRS. Subjects/components not overlapping with the Study are assumed sufficiently addressed in the programmatic documents or covered through other ongoing efforts. Overlapping subjects/components will be the subject of project-specific analyses in the SRWRS.

Table 2-1. Comparison of Major Study Elements

Major Study Elements	ARWRI and EIS	Water Forum Agreement and EIR	SRWRS
Reservoirs and Conveyance	●		
Land Retirement	●		
Stanislaus River Transfer	●		
Reclamation	●	●	
Increased/New Diversions and Conveyance	●	●	●
Conservation Program	●	●	
Groundwater Management and Conjunctive Management	●	●	●
Re-operation of Upper American River Reservoirs		●	
Improved Flow Pattern for Fish		●	
Lower American River Habitat Management		●	
Lower American River Recreation Program		●	

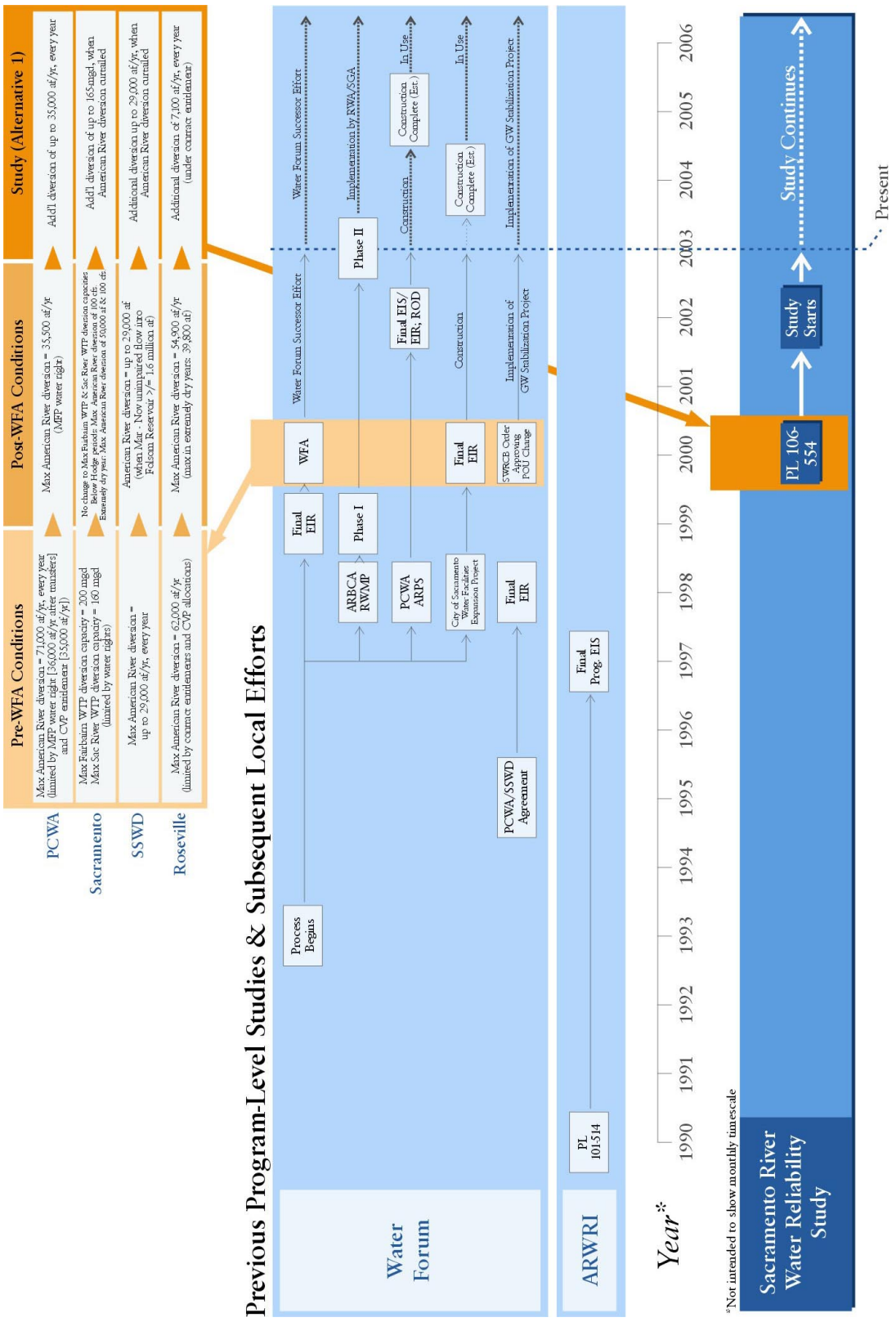

Figure 2-1. Relationship of the SRWRS and Previous/Ongoing Local, Regional, and Statewide Efforts

(a) Previous Program-Level Studies and Subsequent Local Efforts

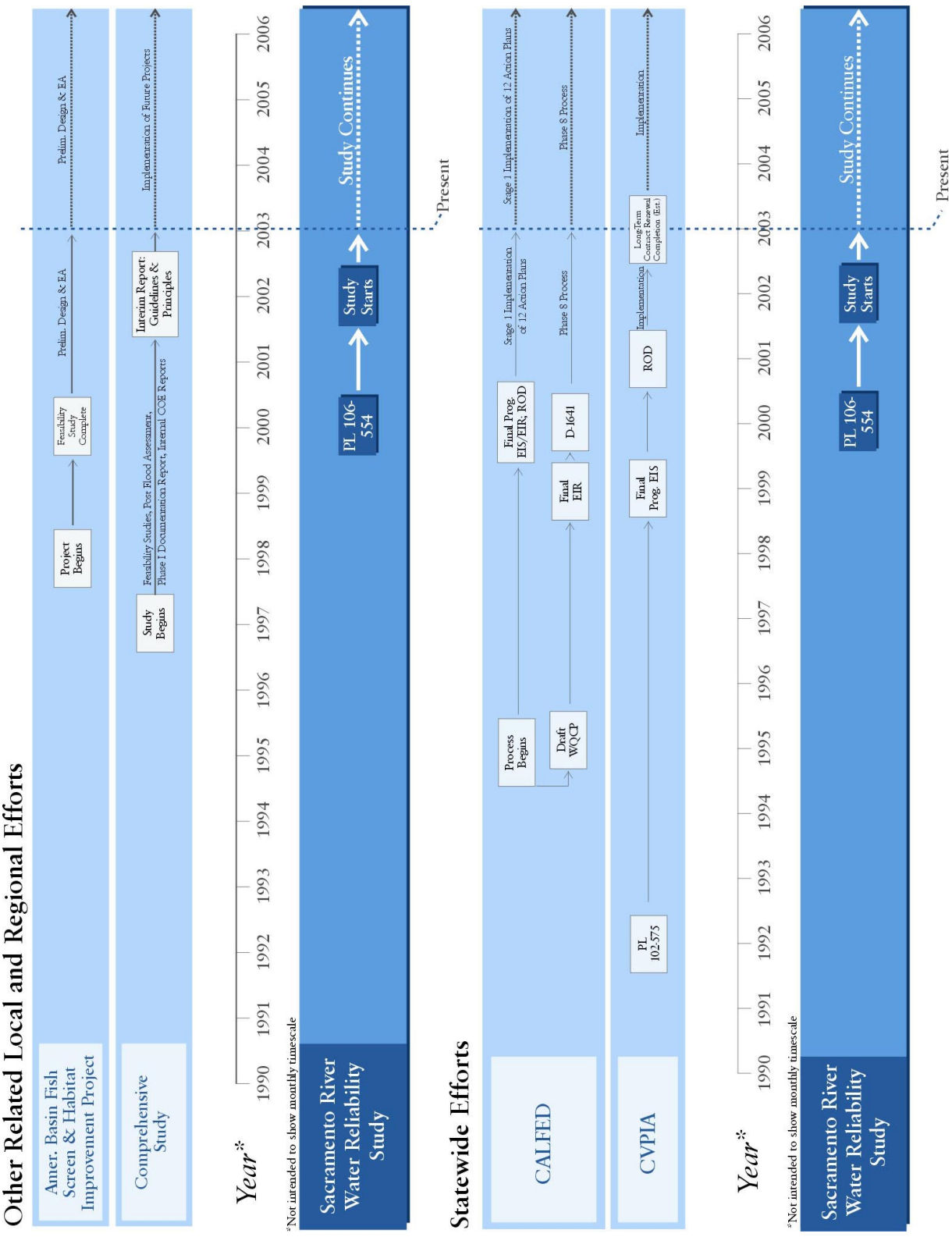

Figure 2-1. Relationship of the SRWRS and Previous/Ongoing Local, Regional, and Statewide Efforts

(b) Other Related Local, Regional, and Statewide Efforts

American River Water Resources Investigation

Before the Water Forum effort, Reclamation and local agencies completed the ARWRI, which has been documented in a Planning Report and the Final EIS in 1997. The five ARWRI objectives included the following:

1. Manage groundwater basins and surface water supplies to maintain beneficial uses and protect water quality

2. Provide water to meet projected water demands in 2030, including M&I and agricultural demands in five counties (El Dorado, Placer, Sacramento, San Joaquin, and Sutter)

3. Provide flows sufficient for water-oriented recreation

4. Sustain the riverine and associated biological environment

5. Be consistent with ongoing activities addressing flood protection needs

Three alternatives were developed and analyzed for the identified water supply and environmental needs in the ARWRI EIS: No-Action Alternative, Auburn Dam Alternative, and Conjunctive Use Alternative. The principal difference between the two action alternatives was the source of new yield. As the names imply, the Auburn Dam Alternative utilized the Auburn Dam as the main source of additional water supply, while the Conjunctive Use Alternative had a large conjunctive management component. The "Common Elements," as referred to in the document, in both alternatives include a Feather River Diversion of up to 74,000 AF per year to serve M&I demands in western Placer County (including 20,000 AF per year for Roseville, 29,000 AF per year for SSWD, and 25,000 AF per year for PCWA), and other components that could be implemented by local water purveyors such as wastewater reclamation, conservation, new and/or expanded surface water diversions, and new surface water storage.

The ARWRI concluded that the Conjunctive Use Alternative is the environmentally superior alternative, without identifying a federal role for meeting the future water demands within the ARWRI study area. However, Reclamation would assist local agencies with further study and/or implementation of the Common Elements, if provided with proper congressional authorization and appropriation.

Sacramento Area Water Forum and the Water Forum Agreement

Created in 1993 and building on the accomplishments of the ARWRI, the Sacramento Area Water Forum (Water Forum) is a group comprised of business and agricultural leaders, citizens groups, environmentalists, water managers, and local governments in the Sacramento region that joined together to fulfill two co-equal objectives:

1. Provide a reliable and safe water supply for the region's economic health and planned development to the year 2030; and

2. Preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River.

In 2000, Water Forum members approved the WFA, which consists of seven integrated elements necessary to provide a regional solution to water shortages, environmental damage, groundwater contamination, and limited economic prosperity.[3] These seven elements include:

1. Increased surface water diversions
2. Actions to meet customers' needs while reducing diversion impacts in drier years
3. An improved pattern of fishery flow releases from Folsom Lake
4. Lower American River habitat management element
5. Water conservation element
6. Groundwater management element
7. Water Forum Successor Effort

The WFA also included provisions to assure that as each signatory fulfills its responsibilities, other signatories also honor their commitments. As part of these provisions, all signatories agreed to endorse, and where appropriate, participate in a Sacramento River supply for north Sacramento County and Placer County. It was recognized that this supply could be an additional source of water for conjunctive use in the North Area of the groundwater basin (see **Figure 1-1**). This supply could also provide a surface water supply to help meet a portion of some purveyors' needs in all years, which would contribute to a reliable supply for the area and reduce the need for some purveyors to divert from the American River in drier years.

The groundwater management element prescribed in the WFA is a major step toward meeting "actions to meet customers' needs while reducing diversion impacts in drier years" because it reinforces the regional groundwater resources for dry-year supply. Signatories of WFA will voluntarily leave surface water in the American River during "dry" years (i.e., forbear surface water diversions to which they are entitled), and use other water supply sources to meet water demands (e.g., groundwater, surface water diversions below the confluence of the American and Sacramento rivers, additional conservation, etc). Conversely, the signatories will maximize surface water diversions in "wet" years, allowing the groundwater basin to recover for use during the next dry cycle. Such a program requires modifications to current operations and construction of additional facilities for surface water diversions, groundwater recharge and extraction, and associated conveyance systems to maximize the flexibility of the regional water supply envisioned by the WFA.

LOCAL AND REGIONAL STUDIES, PROJECTS, AND PROGRAMS

The most relevant local and regional studies, projects, and programs are ongoing WFA implementation efforts.

Water Forum Agreement Implementation Efforts

Implementation of the elements prescribed in the WFA continues to be pursued through local and regional studies, projects, and programs. Each ongoing effort described below is directly related to a Sacramento

[3] In October 1999, a programmatic EIR for the Water Forum Proposal (WFP) was completed. The WFP included the seven elements subsequently approved within the WFA. The EIR states that the WFP was the environmentally preferred alternative with significant and potentially significant impacts to the lower American River and Folsom Reservoir, including effects on certain fisheries, recreational opportunities, and cultural resources. Potential mitigation measures were identified as a part of the lower American River habitat management element of the WFA.

River diversion in one of two ways: (1) such a diversion (or its variation) could be an integrated component of the effort, or (2) the eventual outcome of the effort could provide a backup solution if a diversion cannot be implemented.

Regional Water Master Plan (American River Basin Cooperative Agencies)

In 1998, water purveyors in southern Placer County and northern Sacramento County formed the American River Basin Cooperating Agencies (Cooperating Agencies) and began to implement regional conjunctive management program envisioned by the Water Forum. The objective of this effort, referred to as the Regional Water Master Plan (RWMP), is to develop equitable, cost-effective water resource management strategies for enhancing water supply reliability and operational flexibility for water users of Folsom Reservoir, the lower American River, and the connected groundwater basin. The subsequent implementation of the RWMP is being carried out by local water purveyors, the Sacramento Groundwater Authority (SGA),[4] and the Regional Water Authority (RWA).[5]

A Sacramento River diversion for PCWA, SSWD, Roseville, and Sacramento was identified in the RWMP as a major component of the region's future water supply and opportunities for conjunctive management.

Groundwater Stabilization Project (PCWA, SSWD)

This project would stabilize the overdrafted groundwater basin beneath the Sacramento-Placer region by providing up to 29,000 AF of surface water per year to an area that has historically relied on groundwater. PCWA and SSWD finalized an EIR in 1998 and have implemented in-lieu recharge since 2000. PCWA provides surface water to SSWD through a water sale agreement. This project is an integral part of the conjunctive management program envisioned in WFA.

However, the WFA placed restrictions on SSWD's American River diversions of PCWA water.[6] A Sacramento River diversion could provide surface water to SSWD during years when American River diversions would not be possible, thereby providing additional conjunctive management opportunities and supporting the efforts of the SGA and RWA.

Water Facilities Expansion Project (Sacramento)

Sacramento currently has two water treatment plants (WTPs): (1) the E.A. Fairbairn WTP (Fairbairn WTP), which diverts water from the American River, and (2) the Sacramento River WTP, which diverts water from the Sacramento River below its confluence with the American River. Sacramento is currently expanding these two WTPs to meet increasing demands within its service area. After the expansion, the Fairbairn WTP would have a capacity of 200 million gallons per day (mgd), and the Sacramento River WTP would have a capacity of 160 mgd. In November 2000, Sacramento has completed an EIR for these expansions. The expected completion data for construction is in 2004.

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[4] The SGA is a joint-powers authority (JPA) formed pursuant to the recommendation of WFA, and charged with protecting and regulating of the groundwater basin underlying northern Sacramento County.

[5] The RWA is a JPA charged with serving and representing the regional water supply interests of its members by protecting the reliability, availability, and quality of resources.

[6] The PCWA-SSWD water sales agreement specifies a schedule of increasing diversion amounts (beginning at 7,000 AF in 2000, reaching 29,000 AF in 2014, and continuing at that amount during the remainder of the agreement period). Based on projected unimpaired inflow into Folsom Reservoir, the WFA restricts SSWD's American River diversions under several scenarios (e.g., with and without a Sacramento River diversion, during a specified time period, and following that period, etc.).

As stated in the WFA, Sacramento would reduce its American River diversion at the Fairbairn WTP by up to 100 mgd during low-flow conditions or critically dry years. Expanding tthe Sacramento River WTP would allow diversions to be shifted from the American River to the Sacramento River, alleviating environmental concerns over using the new treatment capacity on additional American River diversions during low-flow conditions. However, due to limitation of potential expansion, the new Sacramento River diversion would only recover part of the reduction in reliability due to the American River diversion reductions.

American River Pump Station Project (Reclamation, PCWA)

The American River Pump Station (ARPS) project would: (1) provide facilities that would allow PCWA to divert up to 35,500 AF per year of its Middle Fork Project (MFP) water rights, (2) eliminate a safety issue associated with the Auburn Dam bypass tunnel, and (3) allow for all preconstruction beneficial uses of water in what is now the dewatered river channel (e.g., recreation, navigation, and other instream beneficial uses). Reclamation and PCWA completed a final EIS/EIR in June 2002 for the project. PCWA approved the project in July 2002, and Reclamation issued a Record of Decision (ROD) for project implementation in September 2002. Construction is expected to start in 2003 and last about 2 years.

Other Related Local and Regional Studies, Projects, and Programs

Many local and regional studies, projects, and programs can be related to the SRWRS directly and indirectly because of the connection of California water supply system. The following studies, projects, and programs are among those could have close relationship.

American Basin Fish Screen and Habitat Improvement Project (Natomas Mutual Water Company)

When completed, the American Basin Fish Screen and Habitat Improvement Project (ABRSHIP) would consolidate five Sacramento River diversions of the Natomas Mutual Water Company (NMWC) and several local riparian water right holders into two diversions with positive barrier fish screens. The WFA recommends this consolidation.

The ABRSHIP also would eliminate a dam at the mouth of the Natomas Cross Canal, and would benefit the environment and the Sacramento River fishery. After consolidation, NMWC would divert from the Sacramento River at two diversions near where Sankey Road and Elkhorn Boulevard intersect the levee. NMWC completed a Negative Declaration and an Environmental Assessment in 2003 for the project. Currently, the project is undergoing final design of the facilities. The SRWRS would need to coordinate with the ABRSHIP to consider the possibility of developing diversion at these two future consolidated diversion locations.

Sacramento-San Joaquin River Basins Comprehensive Study (U.S. Army Corps of Engineers, The Reclamation Board of the State of California)

In response to extensive flooding and damages experienced in January 1997, the U.S. Congress authorized the U.S. Army Corps of Engineers (USACE) to provide a comprehensive analysis of the Sacramento and San Joaquin River basin flood management systems and to partner with the State of California to develop master plans for flood management. USACE and The Reclamation Board of the State of California are leading the Sacramento-San Joaquin River Basins Comprehensive Study (Comprehensive Study) to improve flood management and integrate ecosystem restoration in the Sacramento and San Joaquin River basins.

The objectives of the Comprehensive Study are to identify problems and opportunities, set planning objectives and priorities, and develop potential measures to address flood damage reduction and ecosystem restoration. The study would examine a full range of structural and nonstructural measures and strategies. The basin master plans would include implementation plans and supporting programmatic environmental documentation.

The Comprehensive Study has been coordinated and consistent with the CALFED Bay-Delta Program (CALFED). Many CALFED-proposed projects could be benefited from implementation of actions identified in the Comprehensive Study. The development of a Sacramento River diversion should be coordinated with implementation of actions stemming from the Comprehensive Study.

STATEWIDE STUDIES, PROJECTS, AND PROGRAMS

The SRWRS also may be affected by implementation of other previous or ongoing statewide efforts such as the Central Valley Project Improvement Act (CVPIA) and CALFED. These two programs largely govern the overall conditions of water supply planning and management in California.

Central Valley Project Improvement Act

On October 30, 1992, President Bush signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (PL 102-575), which included Title XXXIV, the CVPIA. The CVPIA amends previous authorizations of the CVP to provide fish and wildlife protection, restoration, and mitigation as project purposes equal priority with irrigation and domestic water supply uses, and fish and wildlife enhancement equal priority with power generation.

The Final Programmatic EIS for CVPIA implementation was completed in October 1999, and Reclamation subsequently issued a ROD in January 2001 on implementation of the recommended plan. Programs identified in the ROD for which Reclamation is responsible include CVP contract renewals, the Anadromous Fish Restoration Program (AFRP), CVP reoperation for the AFRP without affecting fulfillment of CVP contractual obligations, Habitat Restoration Program, and dedication of 800,000 AF of CVP water for fish and wildlife purposes, also known as "(b)(2) water."

The operation of a Sacramento River diversion should be consistent with CVPIA and its implementation. In particular, among the SRWRS cost-sharing partners, PCWA and Roseville have CVP water service contracts with Reclamation. In particular, the annual diversion of 35,000 AF for PCWA is included in the SRWRS. PCWA and Roseville have completed negotiations for contract renewals with Reclamation – these contracts would be effective following completion of the environmental review process.

CALFED Bay-Delta Program

CALFED was established to develop a long-term comprehensive plan for restoring ecological health and improving water management for the beneficial uses of the San Francisco Bay/Sacramento-San Joaquin Delta (Delta) system. The SRWRS is not part of the CALFED ROD implementation studies; however, coordination with CALFED efforts is required in identifying alternatives to reduce potential water supply impacts, as stated in the SRWRS authorization.

CALFED Programmatic Record of Decision

Following the issuance of a CALFED Programmatic EIS/EIR in July 2000, the CALFED Agencies issued a programmatic ROD in August 2000 that identified 12 action plans, including Governance, Ecosystem Restoration, Watersheds, Water Supply Reliability, Storage, Conveyance, Environmental Water Account (EWA), Water Use Efficiency, Water Quality, Water Transfer, Levees, and Science Programs. The CALFED Agencies then proceeded to Stage 1 implementation of the ROD including the first 7 years of a 30-year program for establishing foundation for long-term actions.

CALFED actions on the Sacramento River and within the Sacramento River Basin that could affect activities in the SRWRS study Area and statewide water management includes storage projects (e.g., Shasta Dam and Reservoir Enlargement, Sites Reservoir, and groundwater storage projects); EWA operations (e.g., complying with biological opinions (BOs), the 1995 Water Quality Control Plan [WQCP] for the San

Francisco Bay/Sacramento-San Joaquin Delta Estuary [see below], and dedication of (b)(2) water); and ecosystem restoration projects. CALFED actions on the American River that could affect the SRWRS may include EWA operations and ecosystem restoration projects. The implementation of these actions may affect the American River, the Sacramento River, and the SRWRS.

State Water Resources Control Board's Decision-1641

As part of the CALFED process, the State Water Resources Control Board (SWRCB) issued a draft WQCP for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary in 1995. The draft WQCP specified revised flow and water quality standards in the Delta and regulated CVP and State Water Project (SWP) operations potentially affecting the Delta. The EIR, which was completed in 1999 for the implementation of the WQCP, concluded that implementing the draft WQCP would have unavoidable impacts on water supply. The subsequent SRWCB Decision-1641 (D-1641) required that the CVP and SWP be responsible for meeting Delta water quality flow and salinity objectives, as specified in the WQCP, until a settlement is reached with other Sacramento Valley water right holders (this settlement process is also known as the "Phase 8 Proceedings"). For the CVP, operating Folsom Reservoir for meeting Delta water quality objectives is considered more efficient and effective because it is closer (i.e., shorter travel time) and water quality of the American River is often better than that of the Sacramento River.

The diversions currently considered in the SRWRS would be affected by the CVP/SWP operations for environmental water needs in the Delta required in the WQCP, especially the operations of Folsom Dam.

Ongoing Storage Investigations

The CALFED ROD describes additional water storage as an important activity to improve water quality and water supply reliability for California. Through the Storage Program, both surface water and groundwater storage projects in the Central Valley will be developed as part of an overall water management strategy. Groundwater and surface water storage may be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs. As part of Stage 1 implementation of the ROD, the following investigations are underway:

- **In-Delta Storage Program.** In-Delta storage would help meet the ecosystem needs of the Delta, EWA, and CVPIA; provide water for use within the Delta; and increase reliability, operational flexibility, and water availability south of the Delta water use by the SWP and the CVP contractors. The lease/purchase of the proposed Delta Wetlands Project and the potential for a new storage project are being explored.

- **Shasta Dam and Reservoir Enlargement.** This investigation explores an expansion to help increase the pool of cold water available to maintain water temperatures in the lower Sacramento River needed for certain fish and to provide other water management benefits, such as water supply reliability.

- **Los Vaqueros Reservoir Expansion Studies.** These studies examines expanding the existing Los Vaqueros Reservoir with local partners as part of an initiative to provide water quality and water supply reliability benefits to Bay Area water users.

- **Sites Reservoir.** The feasibility of a new off-stream storage facility is being evaluated. This new north-of-Delta reservoir would enhance water management flexibility in the Sacramento Valley, and providing fisheries, water quality, and EWA benefits.

- **Upper San Joaquin River Basin Storage Investigation.** This investigation evaluates a range of approaches to increase water supplies through enlargement of Millerton Lake at Friant Dam or a

functionally equivalent storage program. This storage would help restore and improve water quality of the San Joaquin River, and facilitate conjunctive water management and water exchange that would improve the quality of water deliveries to urban communities.

The CALFED ROD also requires development of locally managed and controlled conjunctive management projects such as the program implemented under the WFA for groundwater conjunctive management.

CHAPTER 3. EXISTING CONDITIONS

One of the most important elements of any water resource project is properly defining the scope of problems to be solved and opportunities to be addressed by the SRWRS. This process also includes defining existing and future resource conditions in the study area. The magnitude of change between existing and future conditions not only influences the scope of the problems and needs, but also the extent of related resources that could be influenced by any potential actions. This chapter provides a concise description of existing conditions and **Chapter 4** would identify problems and opportunities that can be addressed by a Sacramento River diversion. **Figure 3-1** shows referenced major rivers, areas, and facilities, and **Table 3-1** provides a summary of major reservoirs shown in the figure.

Table 3-1. Major Reservoirs Within the Study Area and Vicinity

Reservoir (Dam)	River	Owner[1]	Capacity (AF)	DOB[2]	Purposes (Uses of Water)
Black Butte	Stony Creek	USACE	143,700	1963	Flood Management, Storage (Irrigation, Recreation)
Folsom	American	Reclamation	975,000	1956	Multipurpose (Hydropower, Irrigation, Recreation)
French Meadows (L.L. Anderson)	Middle Fork American	PCWA	111,300	1965	Diversion, Storage (Domestic, Irrigation, Municipal, Recreation)
Hell Hole	Rubicon	PCWA	208,400	1966	Diversion, Storage (Domestic, Hydropower, Irrigation, Recreation)
Lake Almanor (Canyon)	North Fork Feather	PG&E	1,308,000	1927	Diversion, Storage (Hydropower, Irrigation)
New Bullards Bar	North Yuba	YCWA	969,600	1970	Multipurpose (Domestic, Hydropower, Irrigation, Municipal, Recreation, Flood Management)
Oroville	Feather	DWR	3,537,600	1968	Multipurpose (Hydropower, Irrigation, Municipal, Recreation, Flood Management)
Shasta	Sacramento	Reclamation	4,552,000	1945	Multipurpose (Irrigation, Hydropower, Municipal, Recreation, Flood Management)
Union Valley	Silver Creek	SMUD	230,000	1963	Storage (Hydropower, Recreation)
Whiskeytown	Clear Creek	Reclamation	241,100	1963	Multipurpose (Hydropower, Irrigation, Municipal)

[1] Reservoir Owners:
DWR California Department of Water Resources
PCWA Placer County Water Agency
PG&E Pacific Gas and Electric Company
Reclamation Bureau of Reclamation
SMUD Sacramento Municipal Utility District
USACE U.S. Army Corps of Engineers
YCWA Yuba County Water Agency

[2] DOB: Completion date of dam and beginning of operation.

SACRAMENTO RIVER SYSTEM

The Sacramento River, which is controlled by Shasta Dam, is the largest river system in California. Major tributaries to the Sacramento River include the American and Feather rivers. These three rivers provide many recreational, agricultural, and environmental resources within Sutter, Placer, and Sacramento counties.

Flow Conditions

Shasta Dam and Lake

After Shasta Dam was built in 1943, the annual average of Sacramento River flow at Verona (upstream of the confluence with the American River) is about 14.3 million AF/year, of which 44 percent is from the Feather River watershed. The Sacramento River is the major water source for the CVP with major storages within the upper basin including Shasta Reservoir (4,552,000 AF), Whiskeytown Lake[7] (241,100 AF) and Black Butte Reservoir (143,700 AF).

The Feather River, with a drainage area of 5,921 square miles, is the largest tributary of the Sacramento River below Shasta Dam. The Feather River flows into the Sacramento River near Verona. Since the construction of Lake Oroville in 1967, the Feather River has contributed on average 6.4 million AF per year to the Sacramento River. Two major tributaries of the Feather River are the Yuba River and the Bear River, contributing about 30 percent of Feather River flow on average.

The largest storage facility in the Feather River watershed is Lake Oroville with a capacity of 3,537,600 AF. The reservoir is owned and operated by the California Department of Water Resources (DWR). Other major reservoirs include New Bullards Bar Reservoir on the North Yuba River (969,600 AF, owned and operated by Yuba County Water Agency (YCWA)), and Lake Almanor on the North Fork Feather River (1,308,000 AF, owned and operated by Pacific Gas and Electric Company (PG&E)). Through PG&E's Drum-Spaulding Project, PCWA receives water diverted from the Yuba River and the Bear River. Reclamation does not own or operate any major water supply facilities in the Feather River watershed.

The American River is another major tributary to the Sacramento River. The American River basin covers about 1,936 square miles and ranges in elevation from 23 feet to more than 10,000 feet. The average annual flow of the American River at Fair Oaks has been approximately 2.77 million AF per year since the Folsom Dam was constructed in 1956. It contributes about 15 percent of the total Sacramento River flow below the confluence at Sacramento. The largest reservoir in the basin, Folsom Reservoir (975,000 AF), is owned and operated by Reclamation for the CVP. Other major reservoirs include the Union Valley Reservoir on Silver Creek (230,000 AF, owned and operated by Sacramento Municipal Utility District (SMUD)), and PCWA's Hell Hole Reservoir on the Rubicon River (208,400 AF) and French Meadows Reservoir on the Middle Fork American River (111,300 AF).

Below the confluence with the American River at Sacramento, the Sacramento River continues to flow down to the Delta, where it merges with the San Joaquin River, and then through San Francisco Bay to the Pacific Ocean. Delta inflows from the Sacramento River, including additional CVP and SWP releases under the WQCP, are about 62 percent of the total inflow. Both the CVP and SWP export water to the San Joaquin Valley and southern California through the Tracy and Banks pumping plants located in the south Delta.

[7] Whiskeytown Lake is a multipurpose reservoir that regulates flow from the Trinity River Basin.

Figure 3-1. Study Area and Vicinity Map

Water Quality

Surface water quality is a function of the mass balance of water quality from tributary streams, diversions, agricultural return flows, subsurface drainage flows, permitted discharges from M&I sources, and urban runoff. In general, the quality of water in the American River is high from the river's headwaters to its confluence with the Sacramento River. However, Feather River water quality generally degrades as the water moves downstream from Lake Oroville to its confluence with the Sacramento River. Conditions generally degrade downstream as a result of agricultural drainage, particularly from the Sutter Bypass.

The Sacramento River, below Shasta Lake to its confluence with the American River, experiences variable water quality conditions largely influenced by flow conditions, temperature, agricultural runoff, and mine drainage from the Iron Mountain area. From the confluence with the American River to the Delta, water quality varies due to urban runoff, the amount of flow from the American River, and agricultural runoff.

Fisheries

More than 30 species of fish are known to use the Central Valley portion of the Sacramento River, which extends from Keswick Dam to the Delta. The upper section of the Sacramento River, between Keswick Dam and Princeton, is of primary importance to native anadromous species, and is presently used for spawning and early lifestage rearing, to some degree, by steelhead, green sturgeon, and all four runs of chinook salmon (i.e., fall, late-fall, winter, and spring runs). Consequently, various lifestages of steelhead, green sturgeon, and all four runs of chinook salmon can be found in the upper Sacramento River throughout the year.

The lower portion of the Sacramento River extends from Princeton to the Delta, and includes the confluences of both the Feather and American rivers. The lower Sacramento River is predominantly channelized, leveed, and bordered by agricultural lands. Aquatic habitat in the lower Sacramento River is characterized primarily by slow-water glides and pools, is depositional in nature, and has reduced water clarity and habitat diversity, relative to the upper Sacramento River. This section of the river provides no spawning habitat for salmonids, but serves as a migratory corridor for (1) fish that spawn in the upper Sacramento River and its tributaries; (2) anadromous fish that spawn in the Feather River and American River basins; and (3) fish emigrating to the Delta. Striped bass and American shad, two nonnative anadromous species, spawn in the lower Sacramento River. Other special status species that occur in the Sacramento River include Sacramento splittail, Delta smelt, and hardhead.

The Feather River and its tributaries are spawning grounds for several special status anadromous species, including fall-run and spring-run chinook salmon, steelhead trout, Sacramento splittail and green sturgeon. Striped bass and American shad, two nonnative anadromous species, also spawn in the Feather River. Fall- and spring-run chinook salmon, steelhead, and shad also spawn in the Yuba River, a major tributary of the Feather.

Folsom Lake and Lake Natoma on the American River support a great diversity of fish species, many of which were introduced. Strong thermal stratification occurs within Folsom Reservoir annually between April and November. Thermal stratification establishes a warm surface water layer and a deeper coldwater layer near the bottom of the reservoir. As a result, the reservoir supports both warmwater and coldwater fisheries. Coldwater releases from the lower elevations in Folsom Reservoir sustain coldwater fisheries in Lake Natoma and help maintain water temperature in the lower American River.

Folsom Dam and Lake

The lower American River below Nimbus Dam is used by over 43 species of fish, including numerous resident native and introduced species, and several anadromous species such as fall-run chinook salmon, steelhead, Sacramento splittail, striped bass, and American shad. This stretch of the river extends 23 miles. The lower American River provides several types of aquatic habitat, including shallow, fast-water riffles, glides, runs, pools, and off-channel backwater habitats.

Seasonal releases from Folsom Reservoir's coldwater pool provide thermal conditions in the lower American River that support annual in-river production of both anadromous salmonid species. Folsom Reservoir's annual coldwater pool volume is not sufficiently large to facilitate coldwater releases during July through September to provide maximum thermal benefits to juvenile steelhead rearing in the lower American River over the summer, and coldwater releases during October and November to benefit fall-run chinook salmon immigration, spawning, and incubation. Consequently, optimal management of the reservoir's coldwater pool on an annual basis is essential to provide the most favorable thermal benefits to both steelhead and fall-run chinook salmon, within the constraints of annual coldwater pool availability.

The Delta and San Francisco Bay together comprise the largest estuary on the West Coast. Over 120 fish species inhabit this estuary during at least a portion of their life cycles. The Delta species include many anadromous species, as well as freshwater, brackish water, and saltwater species. Special status species of the Delta include all four chinook salmon runs, steelhead trout, sturgeon, Delta smelt, Sacramento splittail, and longfin smelt. Other species of primary management concern include American shad and striped bass. The Delta is a primary habitat for striped bass, Sacramento splittail, sturgeon, Delta smelt, and longfin smelt.

Vegetation and Wildlife

The vegetation of the Sacramento River system supports a diversity of terrestrial wildlife species and reflects the Great Valley and Sierra Nevada foothill bioregions of California. Plant community composition within these regions includes riparian, grassland, oak woodland, chaparral, conifer forest, and emergent wetland vegetation types. These terrestrial habitats provide seasonal and year round habitat for many species of native and introduced wildlife. The following description provides an overview of the vegetation and wildlife associated with the Sacramento River, its two major tributaries (the American and Feather rivers), and the Natomas Cross Canal.

Fish weir at Nimbus Fish Hatchery

The Sacramento River supports some riparian vegetation; however, it is limited to narrow bands between the river and the riverside of the levee. The riparian vegetation on the Sacramento River is not as diverse as on the American River. The Sacramento River riparian community consists of valley oak, cottonwood, wild grape, box elder, elderberry, and willow. The shores of the lower Sacramento River are characterized by agricultural use.

Vegetation in the Feather River watershed is diverse, ranging from mixed conifer and deciduous forest to sparse ponderosa pine plant communities. Long-term vegetation disturbance and consequent gully erosion have led to dramatic changes in hydrology of the Feather River and its tributaries, resulting in reduced summer flow, higher summer water temperature, lower water tables, reduced meadow storage capacity, and a trend from perennial to intermittent flow. Many down cut streams no longer sustain late-season flow, causing adverse consequences to riparian and upland vegetation, aquatic communities, and downstream water users.

The Natomas Cross Canal joins the Sacramento River downstream from the mouth of the Feather River and upstream from the American River. This channel supports a dense riparian association of black willow,

shining willow, and cottonwood. Riparian cover within the channel provides nesting, thermal, and escape covers for local wildlife populations within the American Basin. The channel also serves as a wildlife movement corridor for wildlife accessing the Sacramento River.

Riparian zone along the Feather River

Numerous species existing throughout Sacramento County are State or federally listed as threatened or endangered or are candidates for listing under the Federal Endangered Species Act (ESA). Sensitive plant species potentially occurring in the area include Northern California black walnut, Sanford's arrowhead, Sacramento Orcutt grass, and Colusa grass. Sensitive wildlife species include Swainson's hawk, valley elderberry longhorn beetle, bank swallow, and giant garter snake. In addition, Sacramento County contains numerous vernal pools, some of which may be inhabited by the federally listed vernal pool tadpole shrimp and the vernal pool fairy shrimp, and several sensitive plant species.

Throughout these regions, native species have declined due to the introduction of invasive non-native species of plant and wildlife. Native riparian vegetation has been replaced with introduced tamarix, giant reed, and tree-of-heaven. Populations of non-native species, including red fox, bullfrog, and brown-headed cowbird, have reduced native wildlife populations.

Land Use/Recreation

Sacramento County includes extensive areas of both urban and agricultural uses. The Sacramento metropolitan area is one of the fastest growing urban regions in California. The county's 1990 population is nearly 4 times that of the 1950 population and 97 percent of the population in the SRWRS study area is considered urban. The City of Sacramento's statewide role, the presence of excellent outdoor recreation opportunities, and the availability of land have contributed to this growth and are likely to continue to be a draw for future urbanization. The southern and southeastern portions of Sacramento County are dominated by a variety of agricultural uses, including croplands, along with rural residential land use.

Placer County also has experienced significant growth since 1950. The southern portion of the county has become increasingly urbanized with the influx of industry and new residential development into the Roseville-Rocklin area in the 1980s. Roseville, the largest city in this part of the county, grew 5-fold in the past 40-year period. Continuation of urban growth in the county is accounted for in local General Plans.

Beach area at Beals Point in Folsom Lake State Recreation Area

Sutter County, which has also experienced consistent growth, has not grown as fast as Sacramento and Placer counties. The southwestern corner of Sutter County is dominated by agricultural use, mainly tree and field crops (rice in particular). The area is sparsely populated (20- to 80-acre parcel minimums) and has no incorporated or urban areas.

The American River, Folsom Lake, Lake Natomas, Sacramento River, and Feather River provide extensive water-related recreation opportunities. The North, Middle, and South forks of the American River are heavily used for whitewater rafting. Downstream, the 18,000-acre Folsom Lake and recreation area offers opportunities for fishing, hiking, biking, swimming, running, camping, picnicking, horseback riding, water skiing, and boating.

Folsom Lake is entirely within Folsom Lake State Recreation Area (SRA), administered by the California Department of Parks and Recreation. Folsom Lake SRA is one of the most popular recreation areas in the state, and its annual visitations average nearly 2.6 million. The predominant recreational uses are water-related, such as boating and water skiing. Downstream of Folsom Dam, Lake Natoma, the Folsom Dam afterbay, is also a unit of Folsom Lake SRA. Developed recreation facilities include picnic areas, bicycle and pedestrian trails, boat launch ramps, and campgrounds. On average, the lake supports about 500,000 visitor use days per year; the predominant recreational activity is trail use.

The lower American River, from Nimbus Dam to its confluence with the Sacramento River, is designated a "recreational river" by both the federal and State governments under the National and State Wild and Scenic Rivers Acts, respectively. Under the National Wild and Scenic Rivers Act (PL 90-542, 16 USC 1271 *et seq*.), federally assisted projects affecting the lower American River are subject to the Secretary of Interior's determination that the projects "will not … unreasonably diminish" the river's recreational value. The State Act restricts construction of diversions unless the Secretary of the Resources Agency determines that construction is needed to supply domestic water to residents of the county and will not adversely affect the natural character of the river.

In addition, approximately 29 miles of the lower American River from Folsom Dam to the confluence with the Sacramento River are included in the American River Parkway Plan, an element of the Sacramento County General Plan. The American River Parkway (Parkway) consists of 14 interconnected parks and a continuous trail system, consisting of approximately 5,000 acres. According to the County of Sacramento, more than 5 million visitors per year use the Parkway and the Parkway's Jedediah Smith Memorial Trail.

There are many recreation opportunities on the Sacramento River from its confluence with the Feather River downstream to Courtland, including boating, fishing, canoeing, rafting, swimming, and picnicking. Fishing is one of the biggest uses of the Sacramento River. Several boat launching and regional park facilities are located along the Sacramento River. The Sacramento River from the Feather River to Cache Slough Junction, a few miles upstream from Rio Vista, is one of the more popular sections for boating. The several-thousand-acre Stone Lakes National Wildlife Refuge is located within this southern portion of Sacramento County, east of the Sacramento River and provides hiking and wildlife viewing opportunities.

The Feather River supports extensive water-related recreation activities at Feather River Canyon, upstream and northeast from the river's confluence with the Sacramento River. There are several marinas, boat ramps, and river parks near the confluence of the Feather and Sacramento rivers.

American River downstream of the Nimbus Fish Hatchery

Aesthetics

The lower American River has been designated a "Recreational River" in the National and State Wild and Scenic Rivers systems and is considered to exhibit high scenic quality. Visual characteristics of the lower American River consist of steep bluffs, terraces, islands, backwater areas, and riparian vegetation. The lower American River is divided into three visual components. The upper river visual component extends from Nimbus Dam downstream to the Gristmill Dam Recreation area and consists of steep bluffs, terraces, riparian vegetation, and shallow water areas and is considered the most visually sensitive area along the river. The middle visual component is not considered as diverse as the upper river and consists of moderately sloped embankments, riparian vegetation, and shallow water areas. The lower visual component is considered the least visually sensitive and is primarily gravel banks, riffles, and ponds.

The Sacramento River segment with the richest visual variety extends from Keswick Dam downstream to Red Bluff. The segment below that, extending from Red Bluff to the confluence with the lower American River, is largely confined by levees and rock revetment bank protection. The latter segment has less visual variety and is considered less pristine in appearance than the upper section of the river. The lower Sacramento River, extending from its confluence with the lower American River downstream to the Delta, is not considered visually sensitive as it is now leveed and bordered by agricultural land.

The Feather River segment near the confluence with the Sacramento River is located in an agricultural area in Sutter County. The terrain is generally flat, with little variation. The river channel is wide and contains turbid, slow-moving water. The river is visible from the Garden Highway, which is not heavily used, and views of the river are limited because of the surrounding flat topography.

The visual character of the Sacramento River south of Verona is typified by large expanses of flat agricultural lands divided by vegetated waterways and developed uses. Visual perceptions of the area are most easily characterized according to the viewer's location: views from the river, and views from the levee areas. Vistas from the river and from riverside residences are primarily short-range, due to the higher elevation of the adjacent levees. Foreground views from the water consist of levees, riparian vegetation, and occasional riverside residences and docks. From the levee adjoining the river, the surrounding area appears vast and open. Foreground views from the levee generally consist of roadside vegetation, orchards, and cultivated fields. In the middle ground and background, views of roadways, agricultural lands, and developed uses tend to blend, due to the area's overall flatness. The Sierra Nevada and the Coast Range are visible to the east and west, respectively, on occasional clear days.

Cultural Resources

Cultural resources include physical resources and intangible cultural values pertaining to paleontology, prehistoric and historic archaeology, history, and Native American ethnography. Paleontological resources include fossil animals and plants of scientific value. Archaeological resources include evidence of past human activities, both prehistoric and historic. Historic resources also include extant structures. Ethnographic resources may include natural or cultural resources, landscapes, or natural environmental features that are linked by a community or group of communities to the traditional practices, values, beliefs, history, and/or ethnic identity of that community or wider social group.

Several dozen prehistoric sites have been identified along the lower American, North Fork American, and lower Sacramento rivers. These include village sites, bedrock milling stations, lithic scatters, and small campsites. More than a hundred prehistoric sites have been identified within the Folsom Reservoir basin. Of particular concern are sites located within reservoir inundation areas. Such sites are subject to degradation due to reservoir siltation, erosion from fluctuating surface water elevations, and vandalism when exposed by low surface water elevations.

Historic sites along the lower American River, North Fork American River, and lower Sacramento River include placer mining districts, railroad-related structures, irrigation and hydroelectric facilities, and historic residential structures. Ethnographic resources include historic Nisenan (southern Maidu) village sites located along the lower Sacramento, lower American, and North Fork American rivers. Many archaeological sites in the area contain burials, and human remains are of substantial concern to contemporary American Indian people. Several federally recognized tribes are located within the SRWRS area. These include the United Auburn Indian Community of the Auburn Rancheria in Placer County and the Shingle Springs Band of Miwok Indians in El Dorado County. There are no federally recognized tribes in Sacramento or Sutter counties. However, the State recognizes several other local groups of Native Americans.

Soils and Geology

Sacramento Valley soils are alluvial in nature found in deep alluvial fans and floodplains. These soils are highly valued for irrigated crops. Soils found along the edges of the Central Valley include brown neutral and red iron pan soils. Soils within Sacramento County have been significantly influenced by human activities for uses such as cultivation and urban development. Historically, gold dredging, hydraulic mining, drainage system development, creation of levees, and cut and fill have all contributed to modifying the original soils. Geologic formations underlying the foothills portion of the plan area consist of complex folded and faulted, metamorphosed volcanic and sedimentary rocks, and has been eroded to a landscape of moderate relief and thin soils.

WATER SUPPLY CONDITIONS

Statewide Water Supply Projects

The regional water supply in California is facilitated mainly through the operations of the CVP and SWP to meet in-basin needs and provide exports for areas south of the Delta. In addition to water supplies provided by the CVP and SWP, groundwater resources within the Sacramento Valley and San Joaquin Valley also provide significant water supplies to local agricultural and M&I water users. Numerous local and regional projects also provide surface water, groundwater, and other supplies. To consistent with ongoing statewide water supply and CALFED ROD implementation, water supply and demand conditions in 2001 are used as existing conditions.

Central Valley Project

The CVP is a multipurpose project operated by Reclamation that stores and transfers water from the Sacramento River, San Joaquin River, and Trinity River basins to the Sacramento, San Joaquin, and Santa Clara valleys. The CVP was authorized by Congress in 1937, and operates as an integrated system to serve water supply, hydropower generation, flood control, navigation, fish and wildlife, recreation, and water quality control purposes.

The CVP service area extends about 430 miles through much of California's Central Valley, from Trinity and Shasta reservoirs in the north to Bakersfield in the south. The CVP also includes the San Felipe Unit, which delivers water to the Santa Clara Valley. In 2001, CVP deliveries totaled about 5.7 million AF, or about 80 percent of its total contracted deliveries of 7.1 million AF.[8] These deliveries included approximately 2.9 million AF to the Sacramento River Service Area, 192,000 AF to the American River Service Area, and 2.6 million AF to the Delta Export Service Area.

State Water Project

The SWP is a multipurpose project operated by DWR. Thirty agencies throughout California have contracted with the SWP for an annual total of 4.2 million AF of water. Existing SWP facilities can supply less than 2.4 million AF during drought conditions. Additional facilities are planned to increase supply. Since 1962, the SWP has delivered water from Lake Oroville in the Feather River watershed through the Delta to the San Francisco Bay area, the San Joaquin Valley, portion of coastal areas, and southern California.

[8] 2001 CVP delivery data from E-mail communication with Reclamation (January 2003).

In 2001, SWP deliveries totaled approximately 1.6 million AF, or about 39 percent of its total contracted deliveries of 4.1 million AF.[9] These deliveries included 31,900 AF to contractors north of the Delta (e.g., Feather River and North Bay) and 1.6 million AF to contractors south of the Delta (e.g., South Bay contractors, San Joaquin Valley, Central Coastal, and Southern California).

Water Supply in the Study Area

Water supply in SRWRS study area is mainly from surface water diversions from the American and Sacramento rivers and groundwater extraction although water supply is also imported from other river basins through the Drum-Spaulding System, owned and operated by the Pacific Gas and Electrics (PG&E).

Surface Water

Table 3-2 summarizes the service areas within the study area by surface water diversion points on the American and Sacramento rivers. The current maximum of water rights/contract entitlements and existing surface water diversions of SRWRS cost-sharing partners are summarized in **Table 3-3**. Detailed information on water rights/contract entitlements and projected demands are presented in **Appendix A: Assessment for Water Supply Needs**. WFA limits future diversions from the American River for cost-sharing partners with certain assumptions (see **Chapter 4** for details).

Table 3-2. Existing Authorized Diversions and Service Areas within the Study Area

Authorized Diversion Point	Service Area
Sacramento River	
Near Sacramento International Airport	Natomas Mutual Water Company
Near Discovery Park	City of Sacramento
American River	
Auburn Dam Site	Placer County Water Agency (MFP water rights)
Folsom Reservoir	City of Folsom
	City of Roseville
	El Dorado Irrigation District
	Folsom Prison
	Placer County Water Agency (MFP water rights and CVP entitlement)
	Sacramento Suburban Water District
	San Juan Water District (SJWD, including Citrus Heights Water District, Orange Vale Water Company, Fair Oaks Water District, City of Folsom)
Folsom South Canal	Arden Cordova Water Service Company
	Clay Water District
	Galt Water District
	Mather Air Force Base
	Omochumne-Hartnell Water District
	Sacramento County Water Agency
	Sacramento Municipal Utilities District
Near Landis Avenue and Ancil Hoffman Park	Carmichael Water District
Near Arden Bar	Sacramento Suburban Water District
Above H Street Bridge	City of Sacramento

[9] 2001 SWP delivery data from DWR Web site (wwwswpao.water.ca.gov/water.html), Notice to Contractors Number 01-15.

Table 3-3. Existing Water Rights/Contract Entitlements by SRWRS Cost-Sharing Partner

Water Purveyor	Surface Water Sources	Water Rights/ Contract Entitlements[1] (AF per year)	Amount Contracted to Other Water Purveyors[1] (AF per year)	Existing Diversion by Water Purveyor[2] (AF per year)
PCWA	MFP water rights	120,000	84,000[3]	13,000
	PG&E water supply contract	100,400		100,400
	CVP entitlement	35,000		0
SSWD	PCWA water sale agreement	29,000		15,300
	Sacramento water delivery agreement	26,064		0
Roseville	PCWA water sale agreement	30,000		35,600
	SJWD water transfer agreement	4,000		
	CVP entitlement	32,000		
Sacramento	Water rights (American River)	245,000	28,644[4]	124,900
	Water rights (Sacramento River)	81,800		

[1] See **Appendix A** for more detailed information.
[2] Preliminary data provided by cost-sharing partners for 2001 and 2002; the amounts are subject to revision; the amount of diversion does not include diversions of other purveyors based on water sale contracts and/or water delivery agreements.
[3] PCWA has water sale contracts with SJWD (up to 25,000 AF), Roseville (up to 30,000 AF), and SSWD (up to 29,000 AF).
[4] Sacramento has a 1964 agreement with SSWD (former Arcade Water District) for up to 26,064 AF of raw water delivery, and a water sale contract with Cal-American (up to 2,580 AF).

Groundwater Resources

The extent of the groundwater basin associated with the study area includes the northern Sacramento County and southern Placer County portion of California's Great Valley Physiographic Province. The groundwater basin is part of the 400-mile-long regional Central Valley aquifer system extending from Red Bluff to Bakersfield.

Under historical natural conditions, groundwater flow underlying northern Sacramento County beneath the Study area was westward from areas of recharge in the foothills toward areas of discharge near the Sacramento River. According to DWR (*Evaluation of Ground Water Resources: Sacramento County, Bulletin 118-3,*1974), groundwater levels were relatively stable between 1930 and 1940. Increased reliance on groundwater pumping since the 1940's have modified these conditions and groundwater levels have dropped an average of approximately 1 foot per year beneath parts of northern Sacramento County. Recent groundwater conditions (see **Figure 3-2**) are represented by fall 1998 groundwater level contours. Notable features include:

- The persistent groundwater cone of depression in the southern portion of the basin, along the Sacramento County/Placer County boundary
- The Sacramento and American Rivers acting as sources of recharge as shown by the mounding of groundwater under and adjacent to the riverbeds
- The east to west gradient resulting from recharge from the High Sierra

Historically, agricultural users in Placer County have utilized groundwater. PCWA has not used groundwater as an M&I supply due to the restrictions in the existing Placer County General Plan. Roseville has sufficient surface water supplies to meet existing demands, so groundwater has not normally been used as a water supply. Until recently, SSWD has mostly relied on groundwater to meet its customers' needs.[10] Since 2000, surface water has also been used by SSWD through the Groundwater Stabilization Project. Sacramento has used both groundwater and surface water to meet demands.

It is estimated that the volume of storage space available in the northern Sacramento County area is approximately 585,000 AF (the difference between groundwater storage under natural conditions and recent groundwater conditions). If not stabilized, the groundwater overdraft could reduce the reliability of groundwater supplies through increased extraction costs, occurrences of dry wells, and threat of water quality degradation.

[10] See **Appendix A** for a discussion of surface water use within SSWD's service area.

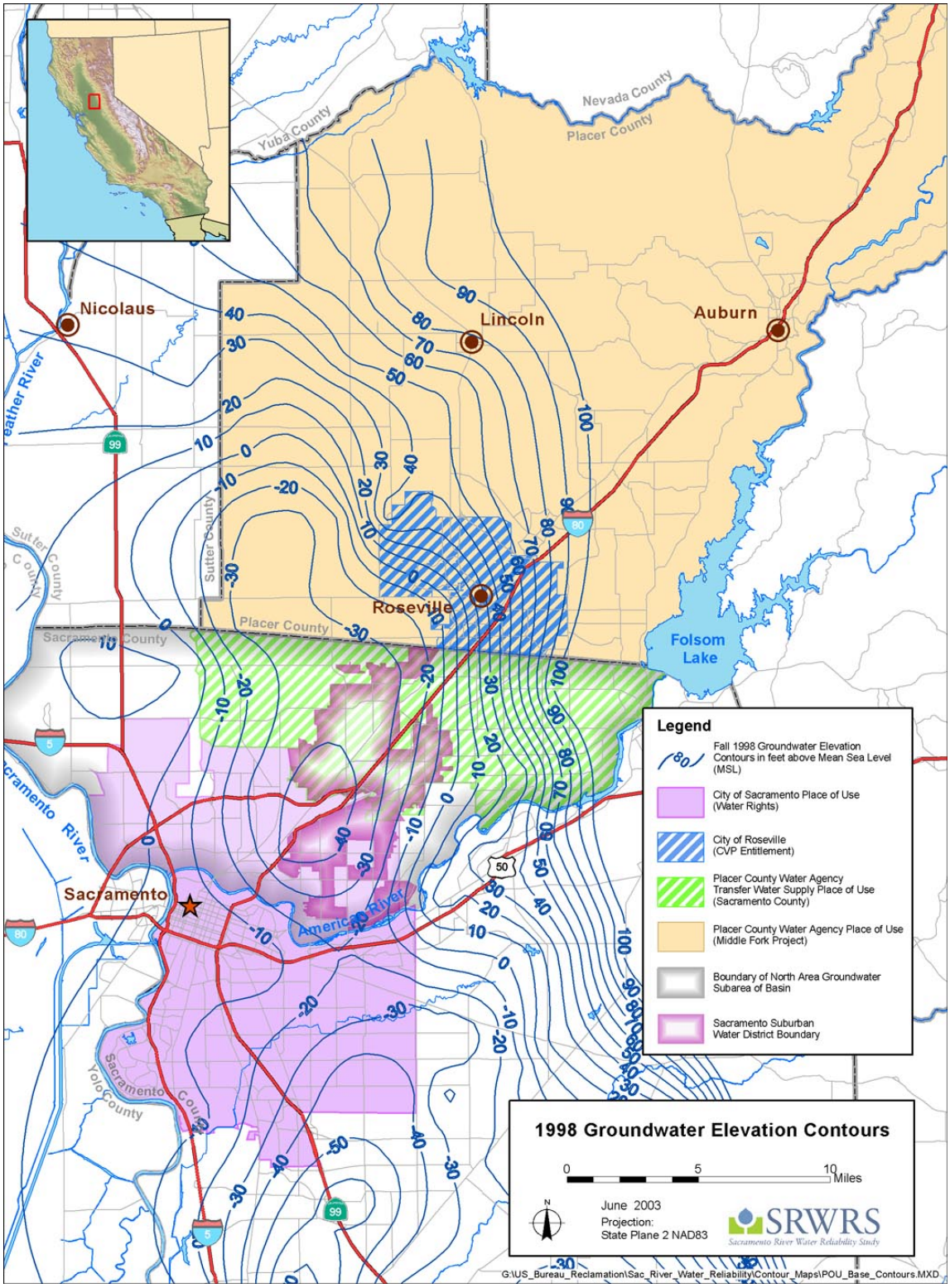

Figure 3-2. 1998 Groundwater Surface Elevations within the SRWRS Study Area

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CHAPTER 4. PROBLEMS AND OPPORTUNITIES

Both the ARWRI and WFA identify increased water supply needs resulting from planned growth in Placer and Sacramento counties, and recognize the importance of preserving the lower American River for its fishery, wildlife, recreational, and aesthetic values. The ARWRI identifies an environmentally preferred alternative that includes additional surface water diversions and regional conjunctive management. The WFA represents a locally initiated, regional solution to developing a strategic plan that (1) provides a reliable and safe water supply for the region's economic health and planned development to year 2030, and (2) preserves the fishery, wildlife, recreational, and aesthetic values of the lower American River.

WATER FORUM AGREEMENT AND A SACRAMENTO RIVER DIVERSION

To implement the objective of preserving the lower American River, the WFA signatories agreed on a set of year-type-dependent limitations on diversions from the American River, provided all required conditions were satisfied. **Table 4-1** shows American River Basin water year types defined in the WFA (Water Forum year types).

Table 4-1. American River Basin Water Year Types Defined in the WFA

Water Forum Year Type	Unimpaired Inflow to Folsom Lake, March – November (AF)	Occurrence Frequency, 1901 through 2002[1]
Wet	Greater than 1,600,000	63 out of 102 years (62%)
Average	Greater than 950,000 and less than 1,600,000	25 out of 102 years (24%)
Drier	Greater than 400,000 and less than 950,000	12 out of 102 years (12%)
Driest	Less than 400,000	2[2] out of 102 years (2%)

[1] Data source: California Data Exchange Center (CDEC).
[2] 1924 and 1977.

WFA Limitations and Assumptions on Diversions from the American River

Tables 4-2 and 4-3 summarize WFA limitations on diversion for the cost-sharing partners (i.e., PCWA, SSWD,[11] Roseville, and Sacramento), from the American River. The year-type-dependent limitations on diversion from the American River are within one of the seven elements in the WFA, and stipulated in their corresponding WFA Purveyor Specific Agreement (PSA). Note that most of the purveyors are limited by diversion amount; however, Sacramento is limited by the allowable diversion rate at Fairbairn WTP on the bypass flow rate, and limited by the total annual diversion at Fairbairn WTP in Water Forum driest years.

[11] SSWD was formed in 2002 through consolidation of the former Arcade Water District (AWD) and the former Northridge Water District (NWD). NWD has a water sale agreement with PCWA for 29,000 AF of Middle Fork Project (MFP) water used in a groundwater stabilization program. In 2000, as part of the WFA, NWD entered into a PSA containing provisions for delivery of 29,000 AF from PCWA's MFP. Following the consolidation, these provisions were applied to the former NWD's service area of SSWD. AWD was not a WFA signatory. Currently, SSWD has a draft consolidated PSA that is under review by the Water Forum Successor Effort.

Table 4-2. Summary of WFA Limitations on Diversions from the American River for PCWA, SSWD, and Roseville

Water Purveyor	WFA Limitations on Annual Diversion from the American River[1] (AF)	Source	Notes[1]
PCWA	35,500	MFP	
SSWD	29,000	MFP	Wet years only
	26,064[2]	Water rights	Wet/average years only
	3,500[2]		Drier/driest years only
Roseville	58,900[3]	MFP and CVP[5]	Wet/average years only
	39,800 to 54,900[4]		Drier years only
	39,800		Driest years only

[1] See **Appendix A** for details.
[2] Based on the draft PSA for SSWD currently under review by the Water Forum Successor Efforts. See footnote on page 4-1.
[3] Includes 4,000 AF of water transferred from SJWD.
[4] Linearly proportional based on March-through-November unimpaired inflow to Folsom Lake between 400,000 and 950,000 AF.
[5] WFA limitations are on the total amount of diversions from these two contract entitlements.

Table 4-3. Summary of WFA Limitations on Sacramento's Diversions at Fairbairn WTP under its Water Rights

Criteria	Period	Maximum Diversion Rate at Fairbairn WTP (cfs)
If the flow bypassing the diversion at the FWTP is greater than the Hodge Flow Condition[1],[2]	1/1 – 12/31	310
If the flow bypassing the diversion at the FWTP is less than the Hodge Flow Condition[1],[3],[4]	1/1 – 5/31	120
	6/1 – 8/31	155
	9/1 – 9/30	120
	10/1 – 12/31	100

[1] Hodge Flow Condition: Parties to the litigation (*Environmental Defense Fund et al. v. East Bay Municipal Utility District*) cannot divert water from the American River unless instream flows measure at least 2,000 cfs from October 15 through February; 3,000 cfs from March through June; and 1,750 cfs from July through October 14.
[2] In accordance with wholesale agreements, Sacramento may deliver water diverted or treated at Fairbairn WTP to public or private water purveyors on a wholesale basis anywhere within the POU as it existed on January 1, 1997.
[3] Water diverted or treated at Fairbairn WTP may be delivered on a wholesale or wheeling basis to any public or private water purveyors provided the rate of "pumpback" is equal to or exceeds the rate of delivery for these purposes on a daily basis. "Pumpback" is used to assume the existence of a metered raw water conveyance facility delivering water from near the confluence of the Sacramento and American rivers to the Fairbairn WTP.
[4] For all conditions in extremely dry years (Water Forum driest years and/or annual projected unimpaired inflow into Folsom Lake is 550,000 AF or less), and the annual diversion from Sacramento's water rights is further limited to 50,000 AF.

A comparison of these limitations to the water rights and SRWRS cost-sharing partners' water rights and contract entitlements listed in **Table 3-3** suggests affected water-right diversions and contract deliveries include the following:

- PCWA's MFP water right diversion of 500 AF per year, and its CVP contract delivery of 35,000 AF per year
- SSWD's water contract delivery of 29,000 AF per year from PCWA's MFP in Water Forum average, drier, and driest years
- Roseville's water contract delivery of up to 7,100 AF per year from either CVP or PCWA's MFP
- A portion of Sacramento's water-righted diversion from the American River at its Fairbairn WTP. The WFA limitations provide that up to 100 mgd, or 155 cfs, of diversion from the American River would be forgone during summer months when peak demand occurs. However, the resulting

quantity varies by hydrologic condition, precluding easy quantification of potential effect of these limitations.

The aforementioned limitations on diversions from the American River for PCWA, SSWD, and Sacramento were negotiated on the basis that these water purveyors would be able to divert the forgone amount from a diversion on the Sacramento River. Currently, PCWA and SSWD lack access to diversions on the Sacramento River or exchange agreements for such diversions. Similarly, Sacramento has a need for adequate diversion capacity on the Sacramento River to recover the forgone diversion at its Fairbairn WTP and provide surface water for retail, wholesale, and wheeling services to the region on a maximum day (max-day) basis.[12]

Gaps Between Projected Demand and Supply in Absence of a Sacramento River Diversion

An assessment of long-term water supply needs for cost-sharing partners is presented in **Appendix A**, which details existing water rights and entitlements and the gaps between projected 2030 demands and water supplies. **Tables 4-4 and 4-5** show projected demands and supplies considered for SRWRS cost-sharing partners in the assessment.

Table 4-4 Projected 2030 Water Supply Demand by Cost-Sharing Partner Considered in the Assessment of Long-term Water Supply Needs

Water Purveyor	Purpose of Use	Projected 2030 Annual Demand (AF)	Note (See Appendix A for details)
PCWA	Agricultural	140,000	Includes raw water users along PCWA canal system
	M&I	85,400	Based on a slow-growth projection; a future realized growth greater than the assumed slow-growth projection would result in additional unmet demand.
SSWD	M&I	92,227	Includes wholesale service area
Roseville	M&i	64,020	Includes the current city limit and potential annexation of the MOU area.
Sacramento	M&I	257,245	Including the current city limit, the American River Place of Use, and the Natomas City-County Joint Vision area.

[12] The estimated max-day demand is commonly presented in mgd and used as the design capacity for water supply facilities.

Table 4-5. Future Surface Water Supplies and Diversion Points Considered in the Assessment of Long-term Water Supply Needs

Water Purveyor	Annual Surface Water Supply[1] (AF)	Source	Diversion Point	Note
PCWA	35,500	MFP	ARPS	Assumes construction is completed.
	100,400	PG&E	Canal buy points[2]	
SSWD	29,000	MFP	Folsom Dam	Wet years only, for a regional groundwater stabilization project.
Roseville	Up to 54,900	MFP and CVP[3]	Folsom Dam	Assumes currently master-planned WTP expansion is completed.
	4,000	MFP	Folsom Dam	MFP water transferred from SJWD in wet and average years only.
Sacramento	Up to 326,800[4]	Water rights, water wheeling	Fairbairn WTP, Sacramento WTP	Assumes the ongoing expansions of these two WTPs are completed.

[1] Subject to applicable WFA limitations on diversion in dry years; see **Attachment A** for details.
[2] Along the canals of PG&E's Drum-Spaulding System.
[3] WFA limitations are on the total diversion from these two contract entitlements.
[4] Sacramento River water rights: 81,800 AF per year; American River water rights: 245,000 AF per year.

The assessment of water supply needs also includes the consideration of replacement water release, a potentially non-consumptive demand, by PCWA and Roseville. Under the WFA, PCWA would release up to 47,000 AF per year of replacement water (27,000 AF per year for PCWA and 20,000 AF per year for Roseville) in Water Forum drier and driest years to the American River from reoperation of PCWA's MFP reservoirs. The purpose of the replacement water is to offset reductions in flows of the lower American River due to increased future PCWA and Roseville diversions during drier and driest years. The replacement water would remain in the American River until it reaches its confluence with the Sacramento River. However, PCWA has agreed to release the replacement water from its MFP reservoirs only when a water transfer partner exists below the American River outlet. **Table 4-6** summarizes the responsibilities of providing replacement water as stipulated in the WFA. The reoperation of MFP reservoirs to provide replacement water may be subject to refill conditions currently under negotiation between Reclamation and PCWA.

Table 4-6. Responsibility of Providing Replacement Water under PCWA's and Roseville's WFA PSA

Water Forum Year Type	Annual Amount of Replacement Water[1] by Responsible Purveyor (AF)	
	PCWA	Roseville
Wet and Average	0	0
Drier	0 to 27,000[2]	0 to 20,000[2]
Driest	27,000	20,000

[1] The water will be made available by reoperation of PCWA's MFP reservoirs. Releases will be contingent on the following conditions:
a. PCWA's ability to sell the released water for use below the lower American River on terms acceptable to PCWA.
b. PG&E's agreement to such reoperation until the present power purchase contract with PG&E expires in 2013.
c. PCWA's determination that it has sufficient water in its reservoirs for additional releases to mitigate conditions in dry years without jeopardizing the supply for PCWA's customers. [Based on historical hydrology and projected 2030 requirements as set forth in the WFA, previous operational modeling shows that reoperation water should be available for such release and sale without drawing MFP reservoirs below 50,000 AF.]

[2] Linearly proportional based on March-through-November unimpaired inflow to Folsom Lake between 400,000 and 950,000 AF.

The gaps between SRWRS cost-sharing partners' projected 2030 demand and supply identified in the assessment of water supply needs are summarized below (see **Appendix A** for details).

- **PCWA and Roseville would have unmet water supply demands.** The projected unmet demand in 2030 is 34,500[13] AF per year in the PCWA service area and 5,000 AF per year in the Roseville service area (including the potential annexation area west of the current city limit).

- **Sacramento would have unmet water supply demands, especially on the basis of max-day demand.** The surface water shortage ranges from 55 to 155 mgd in the region, which in the future would rely on Sacramento for retail, wholesale, and wheeling services. Although the deficiency in diversion capacity is easily demonstrated by using max-day demand, the actual volume of unmet water supply demand due to WFA limitations varies by hydrologic conditions.

FUTURE WITHOUT PROJECT CONDITION

The Future Without Project Condition[14] describes the conditions that would likely happen in the absence of the actions considered in the SRWRS, while observing WFA limitations on diversions from the American River. These conditions include a projection of future local, CVP, and SWP demands, a collection of actions are currently authorized, funded, permitted, and/or highly likely to be implemented. In particular, the Future Without Project Condition includes actions that SRWRS cost-sharing partners would likely occur in the future to address the projected unreliable water supply conditions. The aforementioned gaps between cost-sharing partners' projected 2030 demands and supplies were used as the basis for characterizing the Future Without Project Condition.

Water Supply Reallocation to Accommodate Projected Unmet Demand

To address the projected unmet demands (gaps between projected 2030 demands and supplies), the cost-sharing partners would reallocate the available water supplies to minimize the resulting overall water supply problem. These actions by cost-sharing partners, described below, may be mutually related by ongoing regional water resources management, and/or may cause changes in the water supply availability of other cost-sharing partner.

PCWA

To address projected unmet demands, PCWA would further reallocate its water supplies in several ways, including using groundwater for M&I supply in areas allowed by applicable laws and regulations, reducing surface water delivery for agricultural use, practicing mandatory extra ordinary conservation, and reducing contract delivery to Sacramento County.

- **Use groundwater for M&I purposes in areas allowed by applicable laws and regulations.** The Placer County General Plan prohibits use of groundwater as an M&I water source. Therefore, groundwater could be used as an M&I water source only in incorporated areas with groundwater accessibility. The City of Lincoln (Lincoln) is the identified incorporated area that could be served by groundwater. The projected 2030 demand[15] for Lincoln is 19,333 AF per year.

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[13] This estimated unmet amount is based on a slow-growth projection. A future realized growth greater than the assumed slow-growth projection would result in additional unmet demand.

[14] This condition will be used as an NEPA baseline for comparison. CEQA requires that the significance of the effects of proposed projects and alternatives be determined through comparing those effects with baseline conditions that reflecting the existing "environmental setting" at the time the Notice of Preparation is issued.

[15] Consistently used in the SRWRS, PCWA's 2030 M&I demands are based on a slow-growth projection. A future realized growth greater than the assumed slow-growth projection would result in additional unmet demand. See **Appendix A** for details.

- **Reduce surface water delivery for agricultural purposes.** PCWA currently delivers surface water to its Service Zone 5 in western Placer County for agricultural use to reduce reliance on groundwater, and to the upper portion of Service Zone 1 in the foothills for agricultural and domestic uses through its canal system. These deliveries would be reduced to supplement the need for M&I supply. Agricultural users in Service Zone 5 have access to groundwater and could use groundwater as alternative source of water for their demands. However, agricultural users in Service Zone 1 do not have access to groundwater due to their foothill location, which could result in water supply deficiency.

- **Implement planned reclaimed water use for agricultural purposes.** PCWA plans to use reclaimed water of about 4,000 AF per year for agricultural use in Service Zone 5.

- **Implement mandatory extra ordinary conservation of M&I use.** Mandatory extra ordinary conservation up to ten percent[16] of surface water demand for M&I use could be imposed in Water Forum drier and driest years. The projected surface water demand for M&I use is 66,067 AF per year, assuming Lincoln would be served by groundwater. That is, the amount of mandatory extra ordinary conservation would be up to about 6,600 AF per year.

- **Reduce contract deliveries within Sacramento County.** PCWA's water sale contracts with SSWD stipulate that the delivery from PCWA's MFP be provided when PCWA has sufficient water to meet its own demands in Placer County. Under the Future Without Project Condition, PCWA experiences water supply deficiencies and thus, would reduce the delivery to SSWD by 10,000[17] AF per year in Water Forum wet years, reallocating this amount to M&I use in Placer County. The reallocated water would be delivered to PCWA's service area through SJWD's diversion at Folsom Dam. In other words, the total diversion of MFP water for SSWD and PCWA from the American River would remain within WFA limitations.

SSWD

In the Future Without Project Condition, SSWD would receive surface water deliveries from PCWA and Sacramento. As a result of PCWA's reallocation of water supply, SSWD would have a reduced surface water supply of up to 19,000 AF per year diverting from the American River at Folsom Dam during Water Forum wet years. The amount of potential reduction in Sacramento's delivery would be determined by hydrologic conditions and actions taken by Sacramento (described later in this section).

To address potential reduction in surface water deliveries from PCWA and Sacramento, SSWD would take the following actions:

- **Increase groundwater use for M&I purposes.** SSWD has access to groundwater, and has largely relied on groundwater for water supply in the past. With reduced availability of surface water supply, SSWD would use groundwater to meet projected M&I demand.

Roseville

No contractual change is anticipated for Roseville in the Future Without Project Condition. Thus, to address projected unmet demand, Roseville would take the following actions:

[16] Per discussion with PCWA staff.

[17] Estimated amount that may be diverted and treated at SJWD's Peterson WTP for PCWA after the WTP's design capacity is restored. PCWA is currently negotiating with SJWD for a dedicated treatment capacity.

- **Increase groundwater use for M&I purposes.** The projected increase in groundwater use would be up to 5,000 AF per year.

- **Implement planned use of reclaimed water for M&I purposes.** Roseville plans to use reclaimed water of up to 2,773 AF per year in Water Forum wet and average years, and up to 5,773 AF per year in driest years. During Water Forum drier years, planned use of reclaimed water would be between those of wet/average and driest years.

- **Implement planned mandatory extra ordinary conservation of M&I use.** Roseville planned to implement mandatory extra ordinary conservation of up to 6,220 AF in Water Forum driest years.

Sacramento

In the Future Without Project Condition, Sacramento would experience difficulties in providing surface water delivery for retail, wholesale, and wheeling purposes to its service area, locations within its water right POU outside of its service area, and the Natomas Joint Vision area. To address the projected unmet demand, Sacramento would take the following actions:

- **Establish priority of surface water deliveries for M&I purposes.** Sacramento would allocate available surface water to areas in the following order: the current city limit, the area north of the American River, and the area south of the American River. Serving the area north of the American River would have priority over serving the area south of the river because groundwater use in this region has already been under SGA's management. A formal authority of groundwater management has not been established for the area south of the river.

- **Increase groundwater use for M&I purposes.** Sacramento and the neighboring water purveyors who would in the future rely on Sacramento for retail, wholesale, and wheeling services have access to groundwater. Historically, most of the neighboring water purveyors have used groundwater as a primary source of water for M&I purposes. Groundwater use in the area north of American River would be consistent with SGA's management.

Preliminary Results of Hydrologic Modeling for the Future Without Project Condition

Preliminary hydrologic modeling to characterize surface water and groundwater supply conditions in the Future Without Project Condition was completed using CALSIM II[18] (CALSIM) and the North American River and Sacramento County Combined Integrated Groundwater and Surface Water Model (IGSM), respectively. The associated assumptions and modeling tools are subject to refinements as the SRWRS progresses.

Modeling Tools

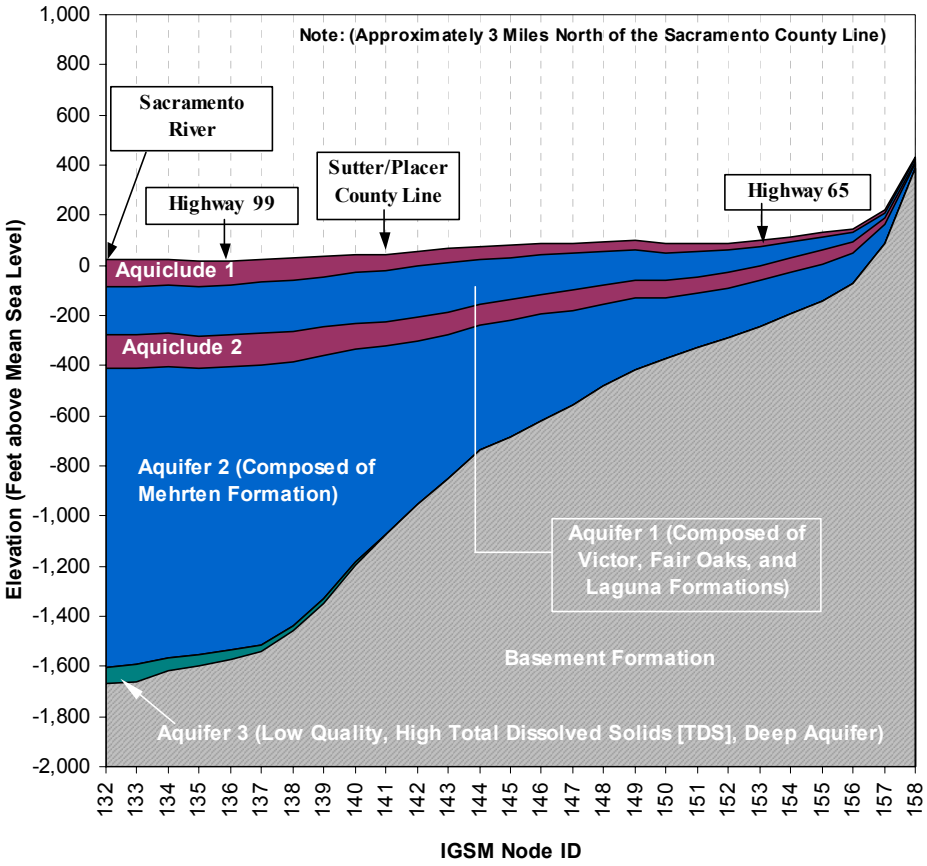
CALSIM modeling, based on the latest revision of benchmark studies dated March 2003, provides long-term statewide and local water supply outlooks in the identified Future Without Project Condition. Water supply reallocations mentioned previously are incorporated in CALSIM modeling to conform to the characteristics of the Future Without Project Condition. Although 2030 is recognized as the common planning horizon for most ongoing studies and projects, including those for CALFED ROD implementation, CALSIM benchmark

[18] CALSIM is the current hydrologic model used to support decisions for operating, planning, and managing CVP and SWP water supply and water quality. See http://modeling.water.ca.gov/ for more information on CALSIM development.

studies for a 2030 level of demand for the CVP-SWP system are not currently available. Thus, the preliminary CALSIM modeling used a 2020 level of demand.

IGSM has been used to evaluate groundwater conditions in the study area by Reclamation, DWR, and local agencies for regional planning efforts such as the ARWRI EIS and WFA EIR. IGSM accommodates input and output of land use and water use data such as demand, surface water deliveries, groundwater pumping and/or recharge, stream/aquifer interaction, and associated losses and deep percolation. The geology and geohydrology in Placer and Sacramento counties, and in particular portions of the investigation area, are complex. Consequently, the IGSM is based on a conceptual model of the groundwater basin represented by a three-layer aquifer system (see **Figure 4-1**).[19] Model specifications are consistent with assumptions used in the WFA EIR with significant updates and enhancements incorporated in the following ARBCA and SGA efforts.

Figure 4-1. Example Cross Section of Groundwater Aquifers Simulated in the IGSM



Summary of Simulated Water Supply Conditions (Preliminary Results)

Table 4-7 summarizes the preliminary results of simulated water supply conditions for the cost-sharing partners by Water Forum year type in the Future Without Project Condition. **Figure 4-2** shows the water supply conditions for the cost-sharing partners in the Future Without Project Condition. While SSWD, Roseville and Sacramento would be able to use groundwater, reclaimed water, and extra ordinary

[19] The conceptual IGSM model is largely based on geologic, hydrologic, and geohydrologic information presented in *Bulletin 118-3* (DWR, July 1974) supplemented by additional local studies.

conservation to meet the projected M&I demands. Significant deficiencies for agricultural use would occur in PCWA service area in Service Zone 1 due to lack of groundwater accessibility at its foothill location. IN addition, no surface water would be delivered to Service Zone 5 for agricultural purposes.

Figures 4-3 and 4-4 depict the groundwater elevations in wet and dry conditions in the Future Without Project Condition. Compared with the groundwater conditions shown in **Figure 3-2**, the most significant changes in Placer County are the large decline in groundwater elevations and aquifer drying along the eastern fringe near Lincoln. Groundwater pumping would severely aggravate the already vulnerable groundwater supplies of Lincoln and Roseville. In Sacramento County, the most significant change is the deepening of the existing cone of depression located in northern Sacramento County, resulting from increased groundwater use in the region.

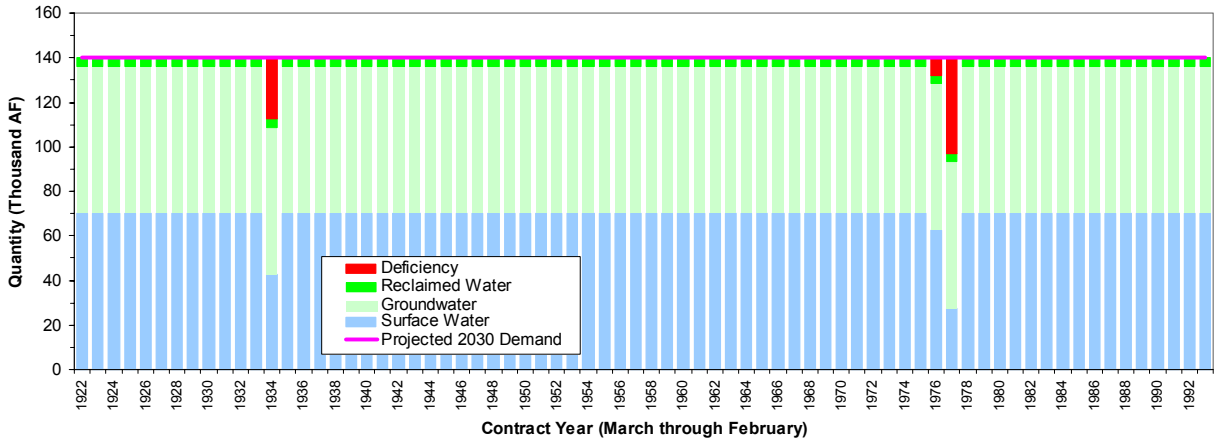
Table 4-7.
Summary of Simulated Water Supply Conditions by Water Forum Year Type in the Future Without Project Condition for SRWRS Cost-Sharing Partners (Preliminary Results)

Water Forum Year Type	Water Purveyor	Type of Use[1]	Annual Demand (AF)	Average Annual Supply (AF)				Average Annual Deficiency (AF)
				Surface Water	Groundwater	Reclaimed Water	Extra Ordinary Conservation[6]	
Wet	PCWA	Ag	140,000	70,000	66,000	4,000	0	0
		M&I	85,400[2]	75,900[4]	9,500[5]	0	0	0
	SSWD	M&I	92,300	36,300	56,000	0	0	0
	Roseville	M&I	64,000	58,000	3,200	2,800	0	0
	Sacramento	M&I	257,200[3]	193,500[3]	63,700	0	0	0
Average	PCWA	Ag	140,000	70,000	66,000	4,000	0	0
		M&I	85,400[2]	75,400	10,000[5]	0	0	0
	SSWD	M&I	92,200	15,300	76,900	0	0	0
	Roseville	M&I	64,000	57,800	3,400	2,800	0	0
	Sacramento	M&I	257,200[3]	188,900[3]	68,300	0	0	0
Drier	PCWA	Ag	140,000	66,800	66,000	4,000	0	3,200[6]
		M&I	85,400[2]	70,100	13,400[5]		1,900	0
	SSWD	M&I	92,200	2,100	90,100	0	0	0
	Roseville	M&I	64,000	43,800	17,400	2,800	0	0
	Sacramento	M&I	257,200[3]	189,400[3]	67,800	0	0	0
Driest	PCWA	Ag	140,000	48,600	66,000	4,000		21,400[6]
		M&I	85,400[2]	61,700	17,100[5]	0	6,600	
	SSWD	M&I	92,200	1,200	91,000	0	0	0
	Roseville	M&I	64,000	44,600	7,400	5,800	6,200	0
	Sacramento	M&I	257,200[3]	176,000[3]	81,200	0	0	0

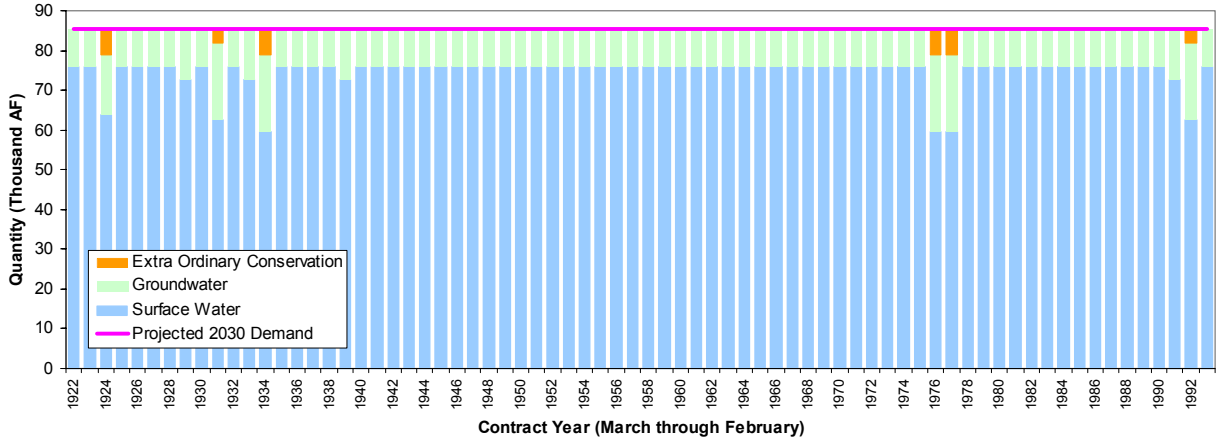
[1] Ag: agricultural use; M&I: municipal and industrial use.
[2] Based on a slow-growth projection; Based on a slow-growth projection; a future realized growth greater than the assumed slow-growth projection would result in additional demand.
[3] Includes demands and surface water deliveries to SSWD.
[4] Includes the 10,000 AF of MFP water reallocated back from SSWD.
[5] For PCWA, Groundwater is assumed to be used for M&I supply in Lincoln, an incorporated area with groundwater accessibility. The amount of groundwater supply for M&I in any given year is limited by the projected demand for Lincoln.
[6] Assumes the maximum amount of extra ordinary conservation in driest years, and a less amount could be imposed in other years when necessary. The maximum amount is 6,600 AF per year for PCWA, and 6,220 AF for Roseville. No extra ordinary conservation is scheduled for SSWD and Sacramento. See **Appendix A** for details.
[7] Agricultural deficiency in areas without groundwater accessibility.

Figure 4-2. Simulated Water Supply Conditions for SRWRS Cost-Sharing Partners in the Future Without Project Condition (Preliminary Results)

(a) PCWA (Ag) (Preliminary Results)



(b) PCWA (M&I) (Preliminary Results)



(c) SSWD (M&I) (Preliminary Results)

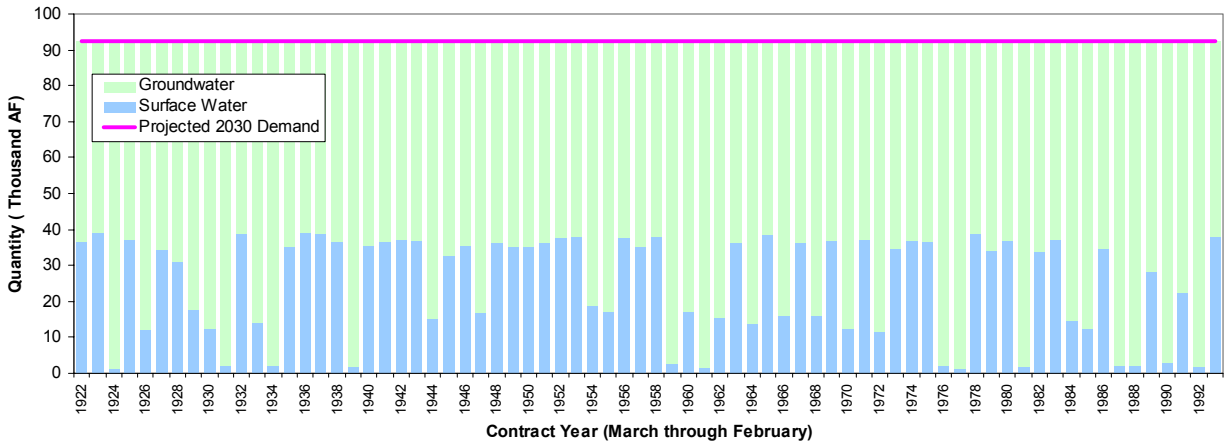
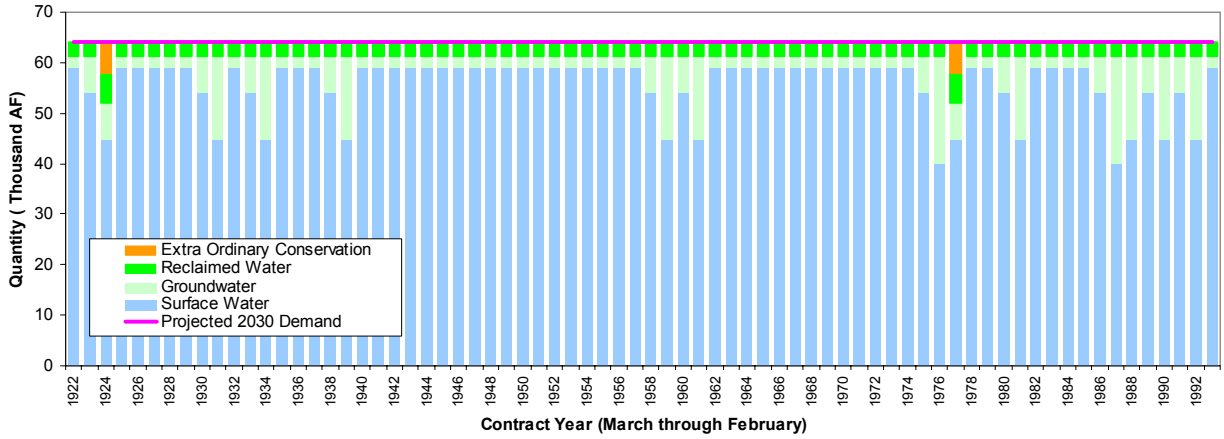
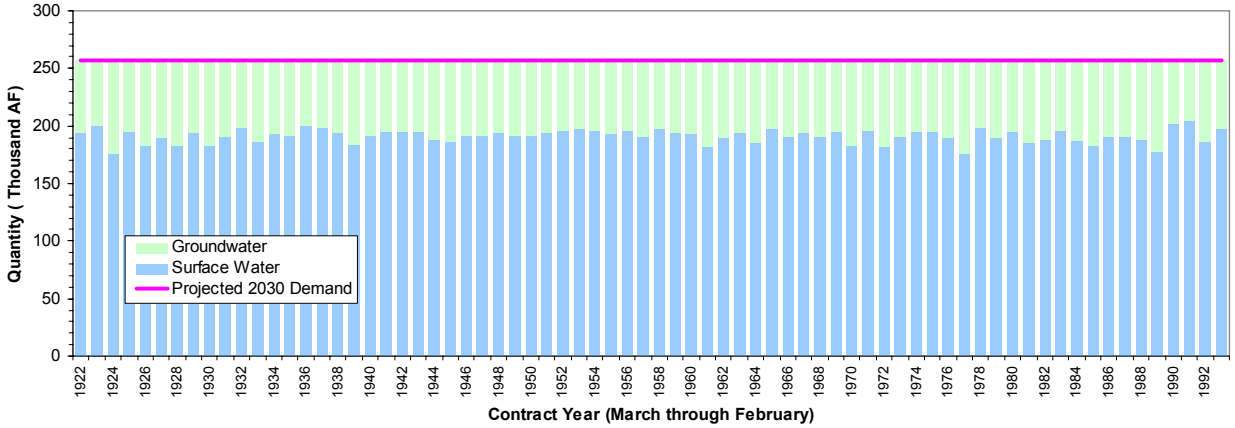


Figure 4-2. Simulated Water Supply Conditions for SRWRS Cost-Sharing Partners in the Future Without Project Condition (Preliminary Results)

(d) Roseville (M&I) (Preliminary Results)



(e) Sacramento (M&I) (Preliminary Results)



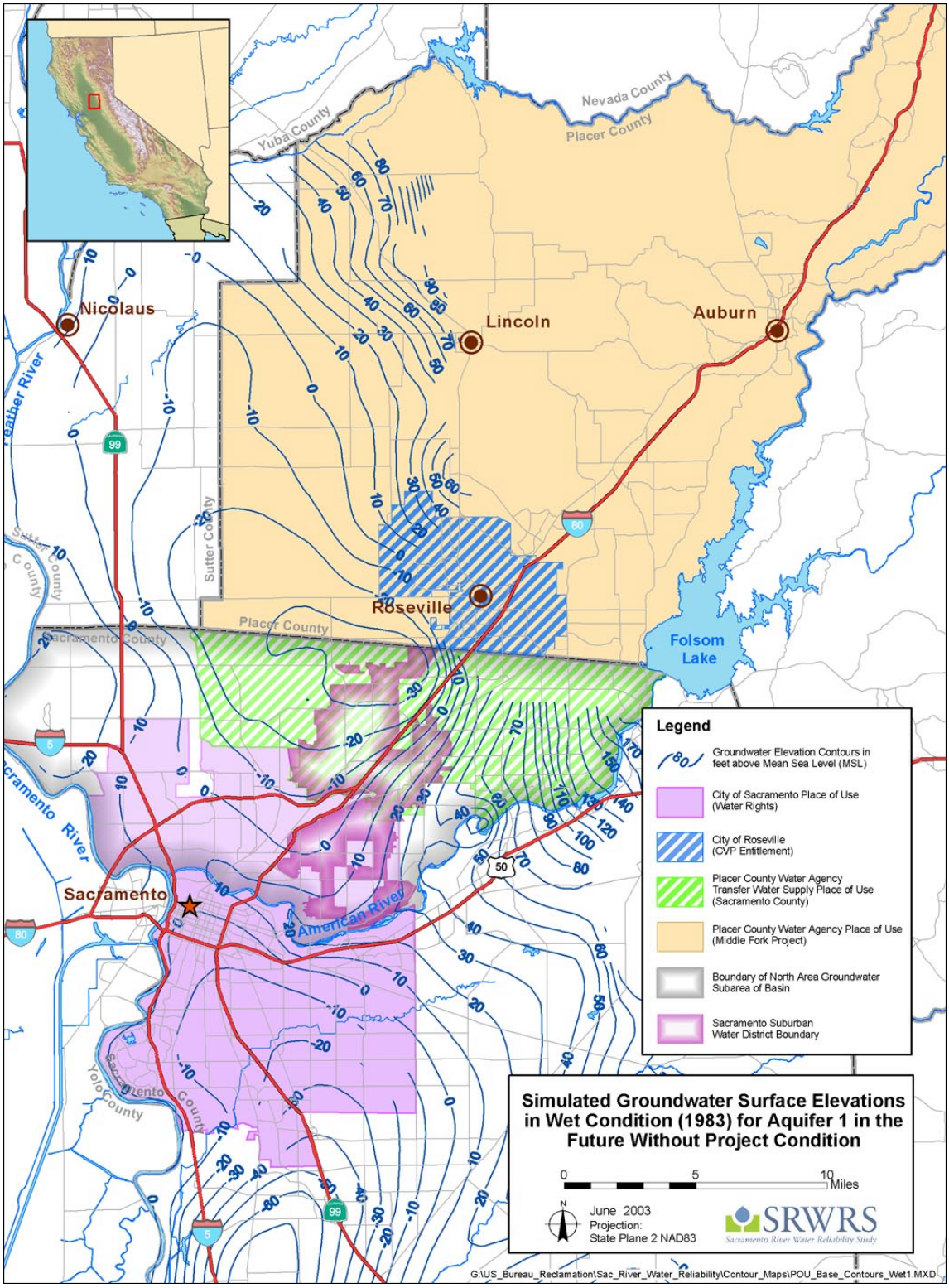


Figure 4-3. Simulated Groundwater Elevations in 1983 (a Water Forum Wet Year) in the Future Without Project Condition (Preliminary Results)

(a) Aquifer 1

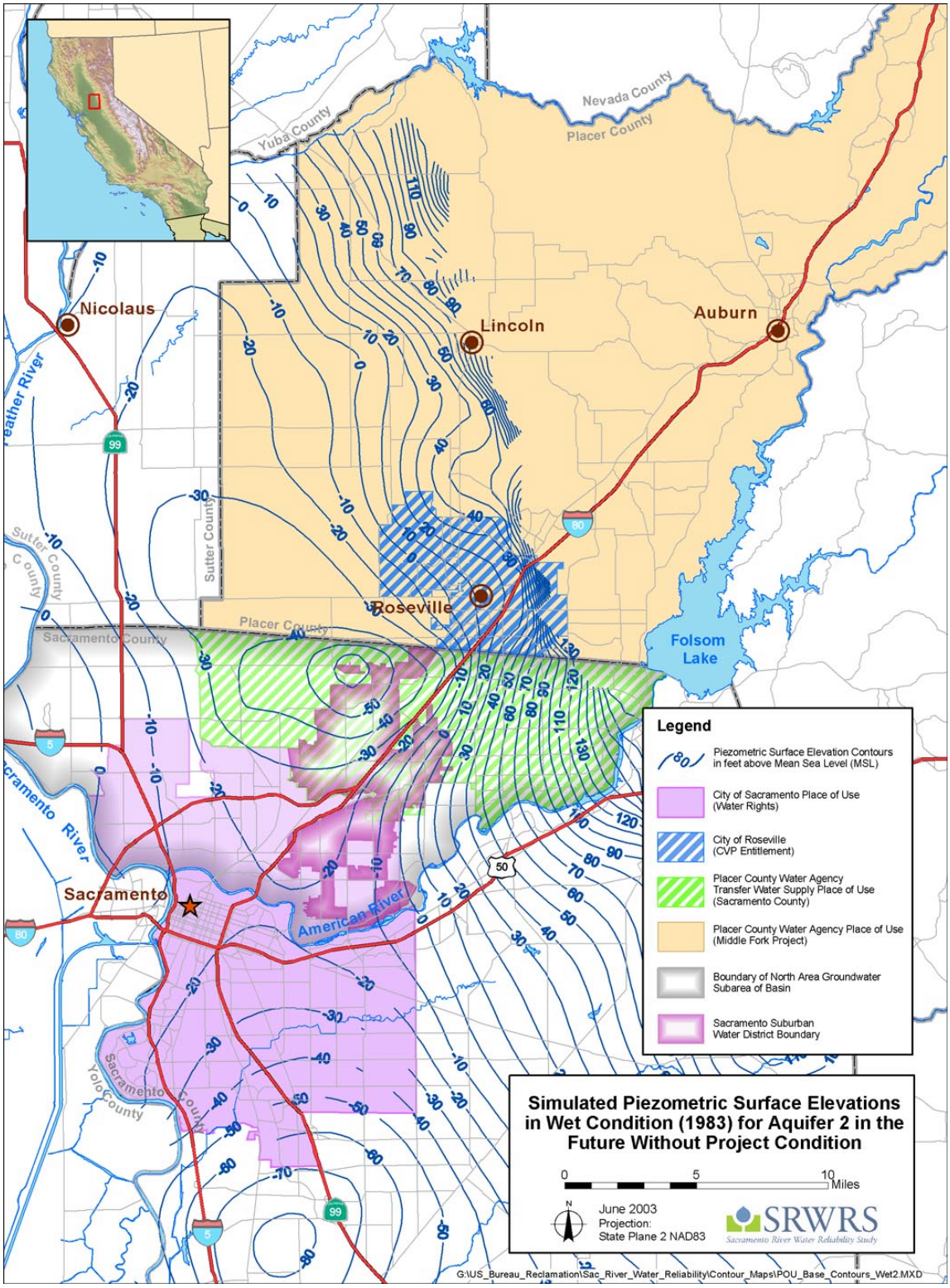


Figure 4-3. Simulated Groundwater Elevations in 1983 (a Water Forum Wet Year) in the Future Without Project Condition (Preliminary Results)

(b) Aquifer 2

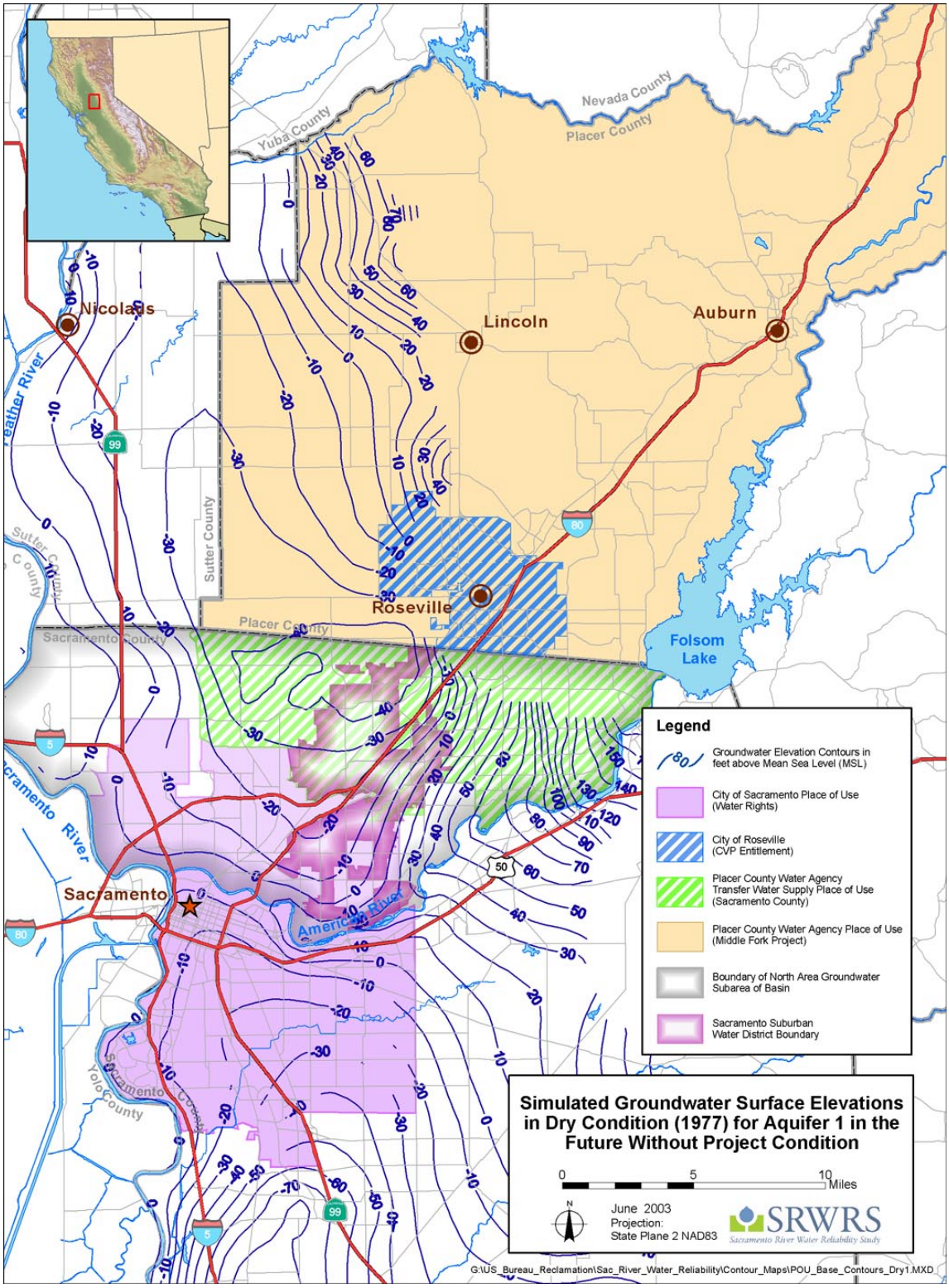


Figure 4-4. Simulated Groundwater Elevations in 1977 (a Water Forum Driest Year) in the Future Without Project Condition (Preliminary Results)

(a) Aquifer 1

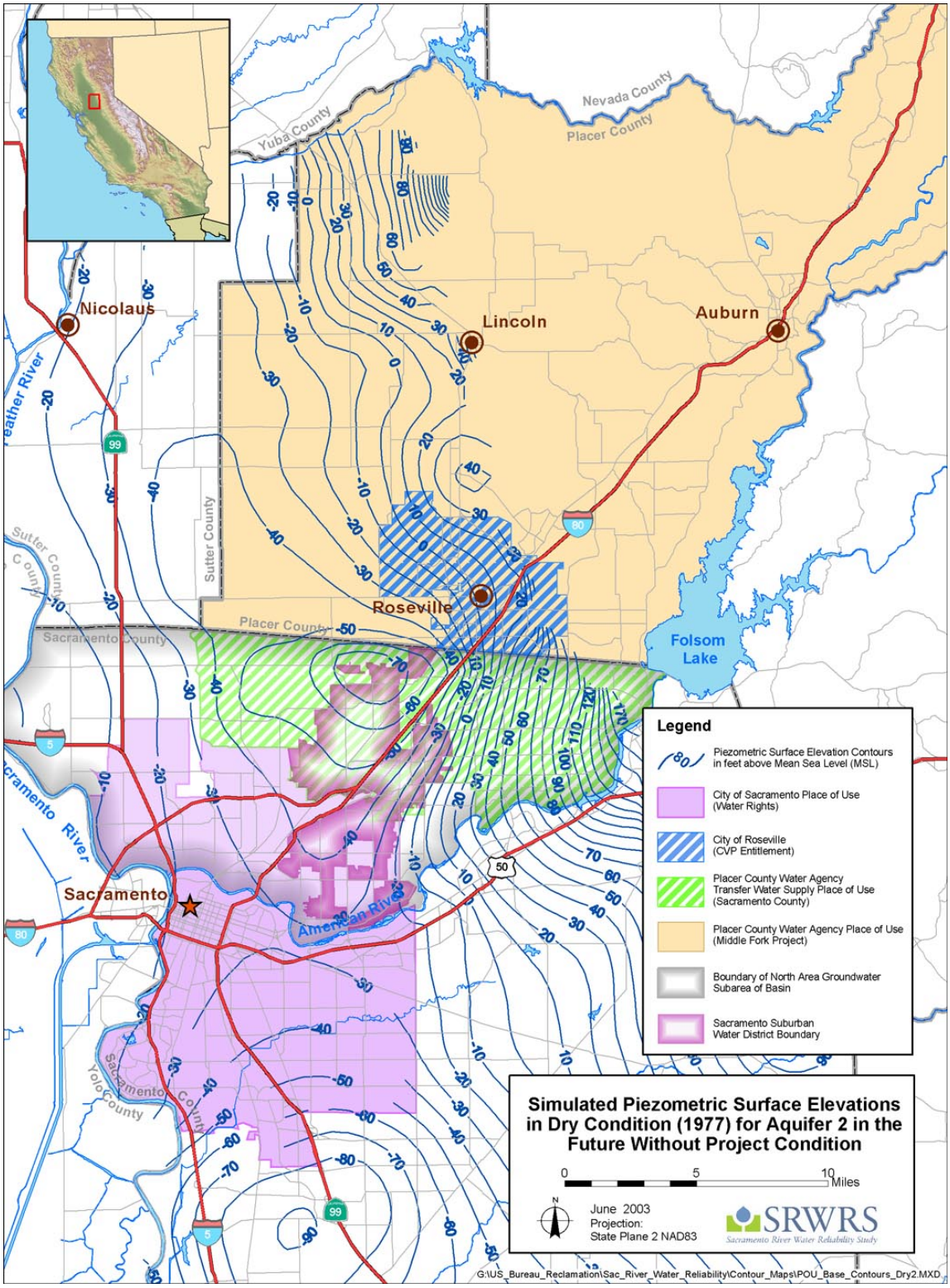


Figure 4-4. Simulated Groundwater Elevations in 1977 (a Water Forum Driest Year) in the Future Without Project Condition (Preliminary Results)

(b) Aquifer 2

IDENTIFIED PROBLEM AND OPPORTUNITIES

Problems are main issues that the SRWRS actively plans to resolve in alternative development; **opportunities** are ancillary benefits that could be anticipated while implementing the selected plan to resolve the identified problems. The following provides a summary of the identified problem and opportunities based on the Future Without Project Condition; a detailed discussion for each problem and opportunities are provided in the subsequent discussion.

- **Loss of water supply reliability in the Sacramento/Placer county region (Problem)** — This problem is a direct consequence of implementing WFA limitations on diversions from the American River without a Sacramento River diversion. The loss of water supply reliability would result in active reallocation of existing water supplies between agricultural and M&I uses, increased use of groundwater, and loss of conjunctive management opportunities envisioned in the WFA.

- **CVP operational efficiency (Opportunity)** — As an integral part of the CVP, Reclamation operates Folsom Dam to meet CVP demands, flood control purposes, and environmental water needs in the lower American River and in the Delta. Developing a diversion to address the above water supply problem from a river other than the American River would allow Reclamation maintain CVP operational efficiency to use water of high quality from the American River Basin in meeting Delta environmental water demands.

- **Ecosystem preservation in the lower American River (Opportunity)** — The WFA was developed as an integral plan to secure regional water supply reliability and preserve the lower American River. Developing a diversion to address the above water supply problem from a river other than the American River would allow the WFA to be implemented as it was originally envisioned.

While the WFA provides a blue print of regional comprehensive solution, individual projects required to support the WFA are currently under development through efforts of WFA signatories (both individually or collectively). A Sacramento River diversion is a key component of the WFA strategy for providing a safe and reliable water supply in the Sacramento-Placer county region while preserving the fishery, wildlife, and aesthetic values of the lower American River. The identified water supply problem stems from the inconsistency between the WFA's vision and availability of a Sacramento River diversion. Finding a solution to address the water supply problem would allow implementation of WFA's original vision and thus, promote the identified opportunities of maintaining CVP operational efficiency and promoting ecosystem preservation in the lower American River.

Loss of Water Supply Reliability (Problem)

If WFA signatories implements the WFA without a Sacramento River diversion, while observing the limitations on diversions from the American River, the following direct consequences would occur within the region:

- **Significant unmet demands resulting from existing beneficial uses and planned growth.**

  The projected unmet demands in 2030 are about 34,500[20] AF per year in the PCWA service area and up to 5,000 AF per year in the Roseville service area. The surface water shortage ranges from 55 to 155 mgd in the region where in the future, would rely on Sacramento for retail, wholesale, and

[20] The estimated unmet amount is based on a slow-growth projection. A future realized growth greater than the assumed slow-growth projection would result in additional unmet demand. See **Appendix A** for details.

wheeling services. The actual volume of unmet demand varies by hydrologic conditions. (See **Appendix A** for details.)

- **Significant reductions in surface water delivery to agricultural users in PCWA service area.**

  The projected unmet demands of PCWA would translate into reductions in surface water delivery to agricultural uses. While groundwater can be extracted in Zone 5 to meet the projected demand, PCWA Zone 1 would experience up to 30 percent of mandatory extra ordinary conservation originated from water supply shortage and lack of groundwater access in its foothill location.

- **Significant groundwater impacts resulting from meeting unmet demands in PCWA and Roseville service areas.**

  The projected unmet demands of PCWA and Roseville would translate into further groundwater use directly or indirectly. PCWA would reallocate the available surface water including reduction in surface water allocation to agricultural use and use groundwater as main M&I supply in areas where allowed by local governing regulations (e.g., in the Lincoln). Roseville would increase groundwater use to meet the unmet demand.

- **Significant loss of in-lieu groundwater recharge opportunity for regional conjunctive management in Sacramento-Placer counties.**

  Limitations on SSWD's diversion of 29,000 AF per year from its contract entitlement in non-wet years (38 percent of years) would result in a reduction of at least 38-percent in-lieu recharge benefit associated with the PCWA-SSWD groundwater stabilization project. Roseville is currently developing an aquifer storage and recharge (ASR) program to facilitate conjunctive management that may not be implementable without a Sacramento River diversion. Sacramento's lack of additional diversion capacity would limit its ability to provide surface water to neighboring areas and water purveyors for in-lieu recharge.

Loss of the in-lieu recharge opportunity for conjunctive management combined with the current overdraft in the groundwater basin in the Placer-Sacramento region would result in additional depletion, increasing the potential of water quality deterioration and permanent loss of usable groundwater aquifer. Not only would the conjunctive management envisioned by the WFA be jeopardized, regional water supplies would become increasing unreliable as a result of depleting the supplemental water supply.

CVP Operational Efficiency (Opportunity)

As an integral part of the CVP, Folsom Dam is operated for contract deliveries, flood management, instream flow needs in the lower American River, and water quality needs in the Delta. Operating Folsom Dam for all intended purposes becomes increasingly challenging due to the combined effects of the interim SAFCA flood operation rules, CVPIA, D-1641, and the recent BO.

Lower American River instream flow requirements were originally defined in SWRCB Decision 893 (D-893). The SWRCB increased the D-893 minimum release schedule through Decision 1400 (D-1400). This decision was applied to the water rights permit for Auburn Dam and does not apply to operation of Folsom and Nimbus dams. However, Reclamation voluntarily operates Folsom and Nimbus dams to meet a modified D-1400 for minimum fishery flows, and more recently has striven to meet the recommended AFRP flows for the lower American River under the CVPIA.

Since 1996, Reclamation has operated according to an interim flood control diagram revised by the Sacramento Area Flood Control Agency (SAFCA). This diagram requires a dynamic allocation of flood

control space from 400,000 to 670,000 AF according to available creditable storage in upstream reservoirs (Hell Hole, Union Valley, and French Meadows).

D-1641 requires that the CVP and SWP meet Delta water quality flow objectives (except for salinity objectives in the southern Delta) until a settlement is reached with other Sacramento Valley water right holders. Currently, Reclamation receives recommendations from the interagency American River Workgroup (AROG) on seasonal fluctuations and ramping of stream flows in the lower American River.

The biological opinion (BO) on interim operations of the CVP and SWP, issued on September 20, 2002, by the National Marine Fisheries Service (NMFS), targets the two species: Central Valley spring-run chinook salmon and Central Valley steelhead. Both species are listed as threatened under the federal ESA, and the Sacramento River and its tributaries, including American River, are considered critical habitat for these species. This BO restates the needs of cold water releases during salmon spawning and rearing seasons, and also singificantly increases the temperature control requirements for the steelhead. This BO sepecifies ramping criteria for releases from Nimbus Dam and requires Reclamation, to the extent possible, to control water temperatures in the lower American River between Nimbus Dam and the Watt Avenue Bridge (River Mile 9.4) from June 1 through November 30 to maintain a daily average temperature of less than or equal to 65ºF to protect rearing juvenile steelhead from thermal stress and from warm-water predator species.

The recent BO may result in a significant conflict for Folsom Dam operations due to the different life stages of these two targeted species at any given time, and there is only limited availability fo cold water in Folsom Lake that could be released to meet temperature requirements for spawning and rearing of both fall-run chinook salmon and steelhead.

Such operational conflicts are likely to intensify as diversions from the American River for in-basin uses increase in the future, as most of future diversions would be at or upstream of Folsom Dam. The resutling reduction in Folsom Lake storage may also reduce CVP operational efficiency by limiting the availability of Folsom Dam releases for Delta water quality needs, thereby increasing reliance on releases from Shasta and Keswick dams. Shifting a number of future American River diversions to an alternate location may partially alleviate pressure on Folsom Dam operations, allowing greater operational flexibility and efficiency.

Ecosystem Preservation in the Lower American River (Opportunity)

Although Reclamation implemented AFRP flow objectives in the lower American River, temperature control problems still exist due to the relatively small coldwater pool available in Folsom Reservoir. With input from the AROG, Reclamation continues to adaptively manage lower American River temperatures through a combination of flow releases and intake shutter operations. The goal of this adaptive management is providing suitable temperatures during the summer months for the Nimbus Fish Hatchery and rearing juvenile steelhead, while minimizing the loss of the coldwater pool remaining for spawning fall-run chinook salmon. Shifting a number of future American River diversions to an alternate location may enhence the opportunity of this adaptive management.

Opportunities to promote Delta ecosystem restoration may exist by shifting a number of future American River diversions to an alternate location; however, such opportunitites may depend on other factors such as SWP actions, lower Sacramento River diversions, the EWA operations, and other ongoing programs and projects. Therefore, the ancillary benefit of promoting ecosystem restoration in the Delta is not identified as an opportunity in the SRWRS.

CHAPTER 5. DEVELOPMENT OF ALTERNATIVES

The development of alternatives for the SRWRS will focus on the water supply problem stemming from implementing WFA limitations on diversions from the American River without a Sacramento River diversion. The opportunities (ancillary benefits) of maintaining CVP operational efficiency and promoting preservation of the lower American River could be anticipated through the implementation of the selected plan to resolve the identified water supply problem, allowing a full realization of the WFA's vision for regional resources management.

This chapter describes the development of preliminary alternatives to meet the planning objectives while satisfying identified planning constraints. The alternatives will be subject to continued refinements throughout the development of the SRWRS.

OBJECTIVES TO BE ACCOMPLISHED BY ALTERNATIVES

To address the identified water supply problem, the following planning objectives for the SRWRS have been identified. These objectives will be used to guide alterative formulation and comparison.

- Providing additional water supply to PCWA to meet water demands resulting from planned urban growth.
- Providing additional water supply to SSWD to enhance the groundwater stabilization project.
- Providing additional water supply to Roseville to meet water demands resulting from planned urban growth and to facilitate a local conjunctive use program.
- Providing additional water supply capacity for Sacramento to ensure water supply reliability and to provide retail, wholesale, and wheeling services to neighboring water purveyors to meet the water demands and reduce groundwater reliance.

CRITERIA AND CONSTRAINTS FOR FORMULATING ALTERNATIVES

Formulating alternatives for the identified objectives is further subject to a series of planning criteria and constraints.

Planning Criteria

The identified planning criteria for the SRWRS include the following:

- Minimizing overall environmental impacts to the extent feasible.
- Being cost-effective.
- Complementing and enhancing the overall reliability of the Placer-Sacramento region's water supply system through increased interconnectivity and source redundancy.
- Being consistent with federal planning guidelines such as *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies.*

- Being consistent with the environmental-preferred alternative of the programmatic ARWRI, including regional groundwater conjunctive management and no major dam construction in the upper American River basin

- Being consistent with the programmatic Water Forum Plan that is stipulated in the WFA, including limitations on surface water diversions from the American River and associated conditions; groundwater resource use in a sustainable manner; operation of PCWA's MFP for replacement water (mitigation water release); lower American River flow patterns, habitat management, and recreation; and water conservation and reclamation guidelines.

Planning Constraints

Planning constraints primarily consist of existing federal, State, and local laws, regulations, policies, and agreements as highlighted under. Constraints related to water delivery quantities considered in the SRWRS are discussed first and separately due to their prevailing significance for formulating alternatives.

Water Delivery Quantities

For the SRWRS, the cost-sharing partners would consider only alternatives using **existing** water rights and contract entitlements. **Table 5-1** presents a summary of requests for additional surface water diversions and treatment capacities necessary to balance projected 2030 demand and supply and to enhance water supply reliability.

Table 5-1. Water Delivery Quantities Considered in the SRWRS

Water Purveyor	Requested Maximum Additional Annual Water Deliveries (AF)	Source	Type of Use	Requested Treatment Capacities (mgd)	Purpose of Requested Treatment Capacities
PCWA	35,000	CVP	M&I	65	Max-day demand
SSWD	29,000[1]	MFP	M&I	15	Reliability and redundancy
Roseville	7,100[2]	MFP	M&I	10	Max-day demand
Sacramento	58,000[3]	Water rights, water wheeling requests	M&I	165	Max-day demand (155 mgd) and redundancy (10 mgd)
Total	129,100			255	

[1] For Water Forum average, drier, and driest years only; the WFA allows SSWD to exercise this entitlement in Water Forum wet years using diversion from the American River.

[2] Roseville would only consider additional diversions from a river other than the American River.

[3] The WFA does not establish a volumetric limitation for Sacramento's total diversion; the estimated additional water supply to meet its projected demand is about 58,000 AF per year, based on the difference between the projected demand and the simulated average diversion for Sacramento that could be realized using then-existing diversion facilities on the American and Sacramento rivers. However, Sacramento could divert up to 81,800 AF per year under its water rights on the Sacramento River at a new diversion by reducing the diversion under its Sacramento River water rights at its existing Sacramento River WTP downstream of the confluence with the American River.

Laws, Regulations, Policies, and Agreements

Development of the SRWRS will be consistent with the following federal, State, and local laws, regulations, policies, and agreements that govern the operation of statewide and local water supply systems. :

- Satisfying requirements stipulated in PL 106-554, the congressional authorizing legislation for the SRWRS, for completing a feasibility study for a Sacramento River diversion that is consistent with the WFA and includes the following components: 1) development of a range of reasonable options, 2) an environmental evaluation, and 3) consultation with federal and State resource management

agencies regarding potential impacts and mitigation measures. Furthermore, Congress requires the SRWRS be developed in coordination with CALFED.

- Observing existing applicable laws, regulations, water rights, contracts and agreements, including, but not limited to, the following:
    - California laws, in particularly Water Codes, and obligations of the cost-sharing partners in their charters and as defined in California laws.
    - CVPIA, especially the dedication of (b)(2) water from CVP contract entitlements.
    - SWRCB D-1641 and WQCP.
    - Existing water rights, local water contracts and/or agreements, CVP/SWP water service contracts.
    - NEPA, CEQA, and ESA, including BOs for the Sacramento River, the American River, and the Delta related to the operations of CVP, SWP, and local projects.

List of Major Existing Laws, Regulations, Policies, and Agreements Applicable to the Study

1902 Reclamation Act
1917 Flood Control Act and subsequent Flood Control Acts
Archaeological Resources Protection Act
BOs for CVP and SWP Operations
CALFED Program and Programmatic ROD
California Department of Fish and Game Codes
California ESA
CEQA
California Water Codes
California Water Rights
CVPIA
Clean Air Act
Clean Water Act
Coordinated Operation Agreement
CVP and SWP Water Service Contracts
Delta Pumping Plant Fish Protection (4-Pumps) Agreement
Executive Order 11988, Flood Plain Management
Executive Order 11990, Protection of Wetlands
Farmland Protection Policy Act
Federal ESA
Federal Water Project Recreation Act
Fish and Wildlife Coordination Act
Historic and Archaeological Data Preservation Act
Indian Trust Assets
Joint Use Agreement
Magnuson-Stevens Fishery Conservation and Management Act
Monterey Agreement
NEPA
National Historical Preservation Act
Placer County Water Agency Act
Porter-Cologne Act
Protection of Historic Properties Act
Resource Conservation and Development Program
Sacramento Area Water Forum Agreement
Safe Drinking Water Act
San Joaquin River Management Agreement
State Reclamation Board Water Code 8608 and 8571
USACE Water Control Manual
Urban Water Management Planning Act
Vernalis Adaptive Management Plan
Watershed Protection and Flood Protection Act

PRELIMINARY ALTERNATIVES

Each alternative identified for the SRWRS will include a plan for operating a package of water supply infrastructure components to meet water supply needs of the cost-sharing partners. The infrastructure components include new or expanded diversion(s) from the Sacramento, Feather, or American rivers, and new or expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines.

The alternatives currently under consideration in the SRWRS (see **Figure 5-1**) include the proposed project with joint diversion and treatment facilities for all cost-sharing partners, and four alternatives. For these four alternatives, the partners may share facilities to a greater or lesser degree.

The proposed project and its alternatives are subject to continued development through a public scoping process, and further considerations on operations, legal, engineering, economic, and environmental issues.

Proposed Project: Elkhorn Diversion Alternative

The proposed project encompasses constructing a joint diversion from the Sacramento River and treatment facilities to serve the cost-sharing partners. The diversion facility would consist of expanding the existing Elkhorn Diversion owned by NMWC on the east bank of the Sacramento River, upstream of the mouth of the American River at approximately river mile 73.3, or constructing a new diversion near the existing Elkhorn Diversion. The proposed project would have a total discharge capacity of 345 cfs. Raw water would be lifted from the pump station to an 84-inch pipeline through which it would be conveyed to a new WTP. Treated water from the new WTP would be conveyed to serve SSWD via a transmission line that would connect to the service areas of the cost-sharing partners.

Implementing a Sacramento River diversion for the cost-sharing partners would require a change in the point of diversion for PCWA's CVP contract and for Sacramento's Sacramento River water right permit, and an exchange agreement between Reclamation and PCWA for SSWD and Roseville diversions under their contract entitlements from PCWA's MFP.

Sankey Diversion Alternative

A Sankey Diversion alternative assumes that PCWA, SSWD, and Roseville would divert water from the Sacramento River near the confluence of the Sacramento River and the Natomas Cross Canal and build separate treatment, storage, and transmission facilities to meet their needs. This diversion would be located at or near the second diversion that NMWC is developing under its CALFED-supported ABFSHIP. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

Feather River Diversion Alternative

A Feather River alternative assumes that PCWA, SSWD, and Roseville would divert water from the Feather River near Nicolaus and build separate treatment, storage, and transmission facilities to meet their needs. The CVP would not be able to supply water directly to any diversion location on the Feather River, and thus a further agreement with the SWP and possibly a modification to the Cooperative Operation Agreement would be required for this alternative.

Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

American River Pump Station Alternative

An American River Pump Station alternative assumes that PCWA would expand its American River Pump Station near Auburn and construct new treatment and transmission facilities to serve its needs. The CVP would not be able to provide a reliable water supply to PCWA at this location and thus, PCWA would divert from its MFP water rights. Reclamation would need to reassign PCWA's CVP contract entitlement to MFP water sale contractors who divert water at Folsom Dam (SSWD, Roseville, or SJWD).

SSWD would divert from the existing SJWD diversion facilities at Folsom Dam. Roseville would increase use of groundwater to satisfy its needs in this alternative, but would have no additional surface water diversions. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

Folsom Dam Alternative

A Folsom Dam alternative assumes that PCWA and SSWD would use the existing or expanded diversion, treatment, and transmission facilities of SJWD at Folsom Dam. Roseville would increase use of groundwater to satisfy its needs in this alternative, but not have any additional surface water diversions. Sacramento would use groundwater to meet projected unmet demand or would divert separately from the Sacramento River at the Elkhorn site, and construct its own treatment and transmission facilities to serve its needs.

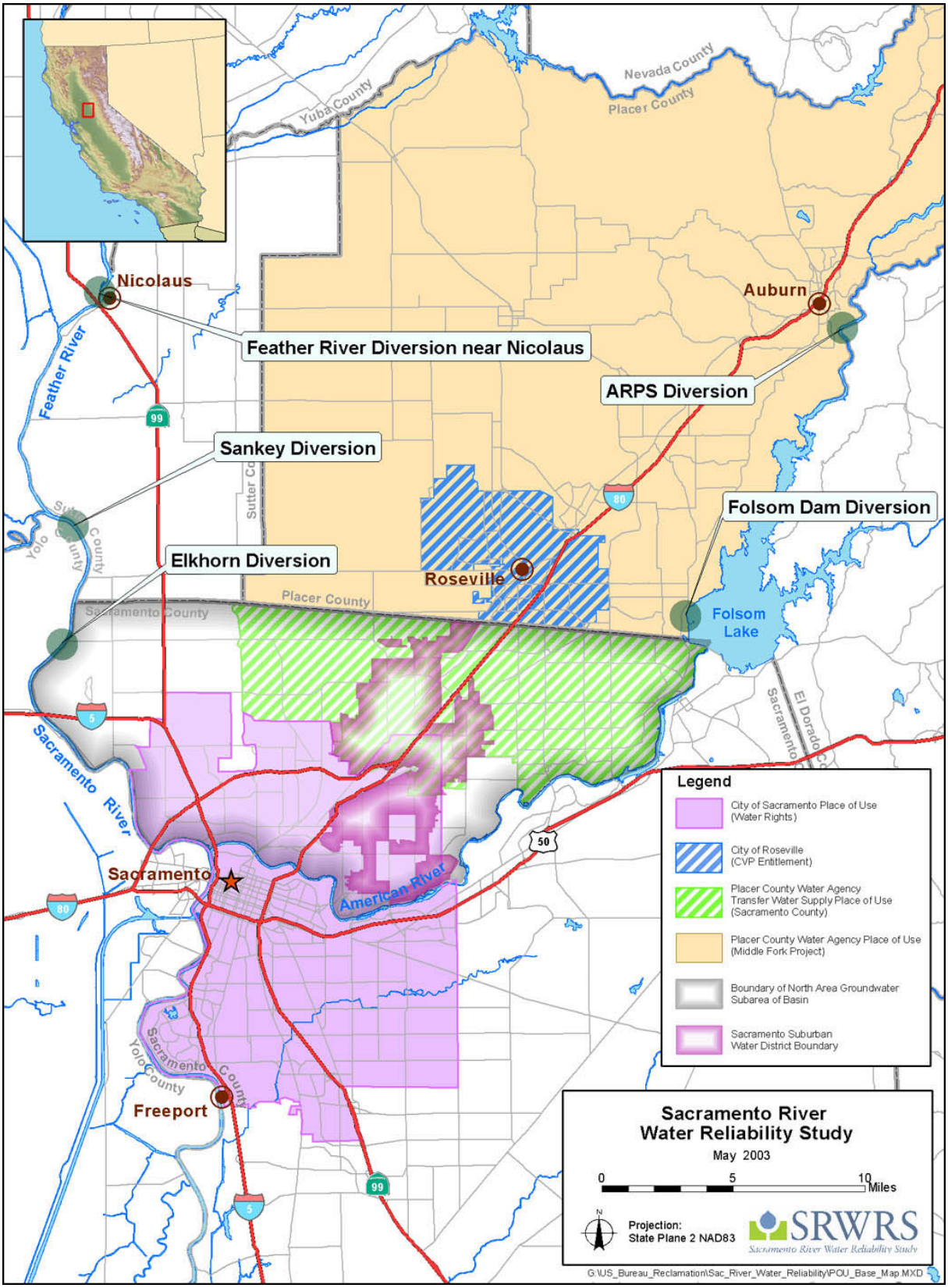


Figure 5-1. Diversion Locations for Alternatives Currently Under Consideration in the SRWRS

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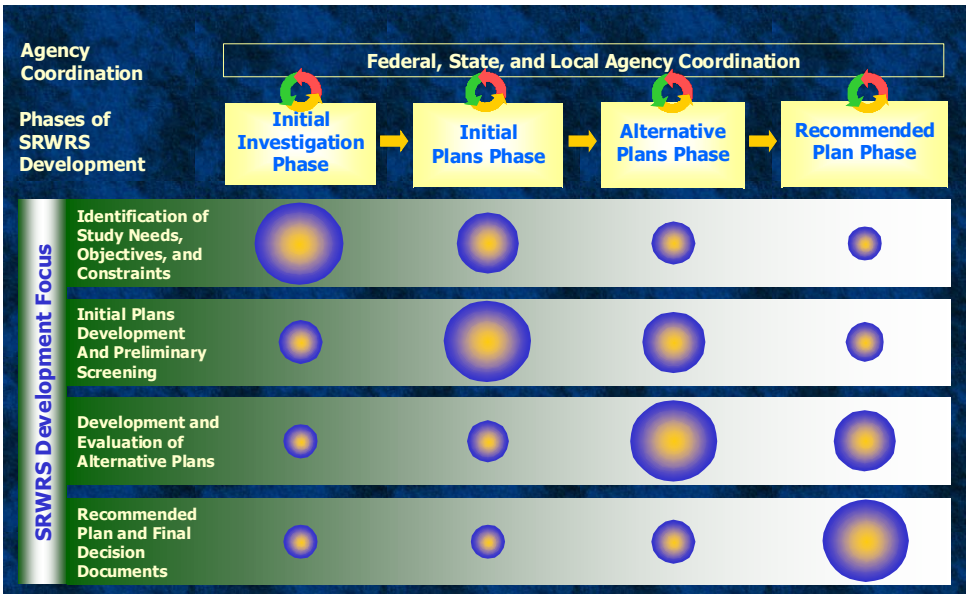
CHAPTER 6. NEXT STEPS OF SRWRS DEVELOPMENT

The SRWRS development consist of the following six steps:

- Identifying existing resource conditions and development of projected future resource conditions without implementation of a project (see **Chapter 4**).
- Defining water resources problems and opportunities to be considered in the SRWRS (see **Chapter 4**).
- Developing objectives for formulating alternative and associated planning criteria and constraints (see **Chapter 5**).
- Formualting potential solutions (alternatives) to meet the identified objectives while satisfying the planning criteria and constraints (see **Chapter 5** for preliminary alternatives).
- Evaluating and comparing potential effects of these alternatives including accomplishments in meeting objectives, resulting water supply and environmental impacts, and economic consideration.
- Recommending a plan for implementation based on the comparison of alternative plans.

These six steps can be generally incorporated into four phases of the SRWRS development, which include the following: (1) Initial Investigation Phase, (2) Initial Plans Phase, (3) Alternative Plans Phase, and (4) Recommended Plan Phase. Throughout these four phases, objectives and tasks of all phases will be considered; however, the primary focus will vary from phase to phase. For example, in the Initial Investigation Phase, the focus will be on problems, needs, and study objectives, but consideration must be given to the ultimate disposition of the decision document. By contrast, in the Recommendation Plan Phase, it will be necessary to reassure that the recommended plan addresses fundamental resources problems. The evolution of the primary study focus throughout the SRWRS development is illustrated in **Figure 6-1**.

Figure 6-1. Phases of SRWRS Development and Corresponding Focus



Progress in each phase will need to be coordinated closely with federal, State, and local agencies and stakeholders and their ongoing projects and programs. A continued effort for public involvement is also essential to the SRWRS.

List of Agencies for Study Coordination

California Department of Boating
California Department of Fish and Game
California Department of Transportation
California Environmental Protection Agency
California Reclamation Board
National Marine Fisheries Service
Natural Resources Conservation Service
Reclamation District 1000
Sacramento Area Flood Control Agency
State Office of Historic Preservation
State Lands Commission
State Water Resources Control Board
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

The SRWRS is currently in the Initial Plan Phase of study development. Tasks to be performed during this phase include the following:

- Initializing public scoping process including issuing the Notice of Intent/Notice of Preparation (NOI/NOP) for the preparation of the EIS/EIR.
- Developing preliminary alternatives.
- Performing initial screening of preliminary alternatives.
- Initializing agency coordination and consultation.
- Continuing public involvement efforts.

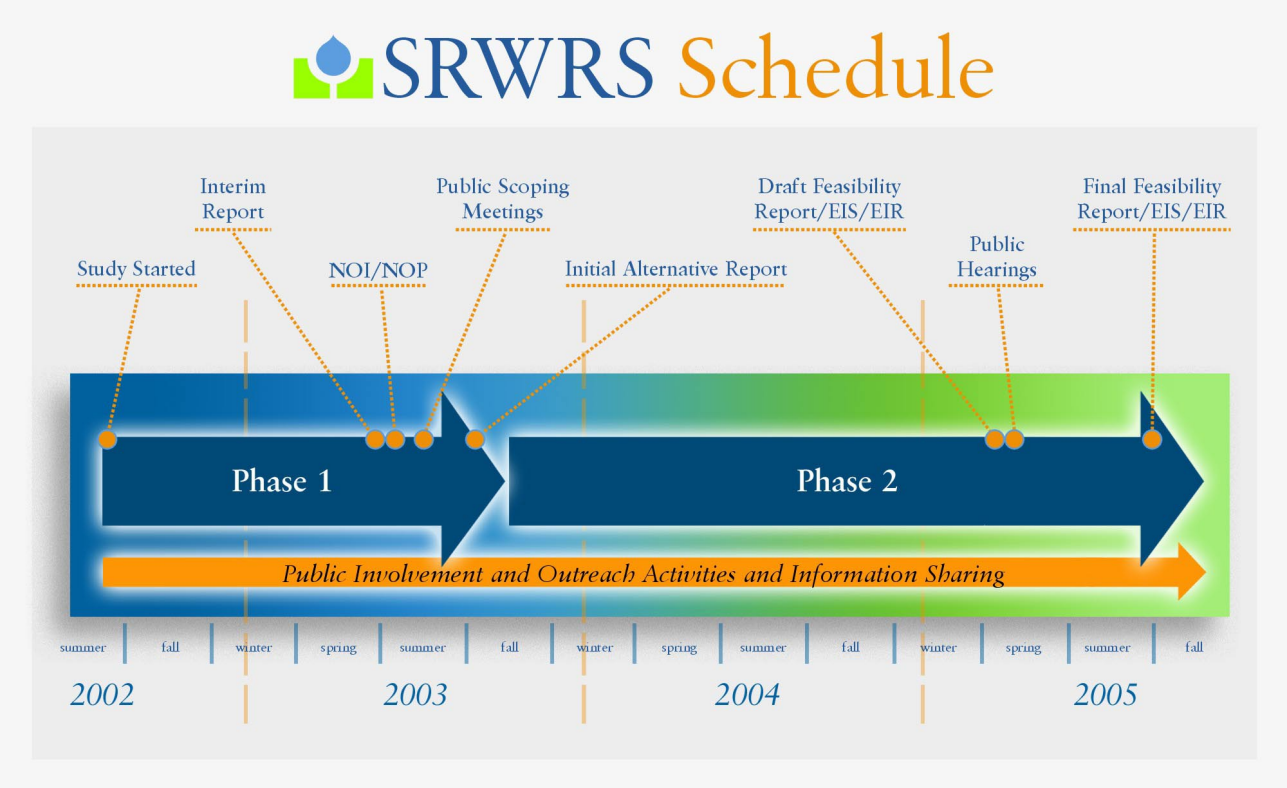
Upon completion of the Initial Plan Phase, the Alternative Plan Phase of SRWRS development will begin with evaluating alternatives for accomplishments in meeting the planning objectives, and associated environmental impacts and economic consideration. A biological assessment and draft EIS/EIR will be prepared in this phase, and a preferred alternative will be identified.

In the final phase of SRWRS development, the Recommended Plan Phase, the efforts would be devoted to completing ESA consultation, continuing public involvement and agency coordination, and finalizing feasibility study report/EIS/EIR. The developed technical information will be used to facilitate the necessary decisions associated with the implementation of the preferred alternative. These decisions include, but not limited by, a federal ROD and resolutions of cost-sharing partners for the SRWRS, necessary contract amendment and/or exchange agreements between cost-sharing partners and Reclamation, permits from SWRCB and other regulatory agencies necessary for diversion and/or construction.

The four phases of SRWRS development are roughly divided into two study phases for administrative purposes. **Phase 1** will cover the Initial Investigation Phase and Initial Plans Phase, focusing on alternative development, preliminary screening, and public involvement and outreach strategies. **Phase 2** will cover the Alternative Plan Phase and Recommended Plan Phase, emphasizing preparation of the feasibility report and environmental documentation. A tentative study schedule is shown in **Figure 6-2**. SRWRS completion is currently expected to span three years with a tentative completion date in 2005. The schedule is subject to revision to reflect progress in study development and agency consultation.

Upon completion of the SRWRS, the final feasibility report and environmental documentation will be submitted to the U.S. House of Representatives' Committee on Resources and to the U.S. Senate's Committee on Energy and Natural Resources, as required by the study authorization.

Figure 6-2. Tentative Schedule for SRWRS Development



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